



## SERVICE MANUAL

# 2621B/2629L INTERACTIVE TERMINAL

### SERIAL NUMBER

This manual applies directly to terminals with  
a serial number from 2146F00100

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LIST OF EFFECTIVE PAGES

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Revision 0 (original) ..... December 1981

This manual applies to terminals with a serial number from 2146F0100. If changes have been made to the terminal since this manual was printed, a yellow "manual updating supplement" (supplied with this manual) will define these changes and explain how to adapt this manual to the modified terminal. These changes will be incorporated in this manual the next time that it is printed.

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HP 2621B AND HP 2629L INTERACTIVE TERMINAL  
SERVICE MANUAL

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This manual provides field service information for the HP 2621B terminal and the 2629L (which is the OEM version and differs from the 2621B only by the front nameplate). This manual is intended to be used by qualified service personnel to install and service the terminal. Because of product design, a modular repair philosophy has been implemented to minimize on-site repair time. There is one other manual associated with this Service Manual: the HP 2621B Interactive Terminal Owner's Manual.

The Owner's Manual provides user information for installing, programming and operating the terminal.

**WARNING**

Always remove ac power before opening the terminal or removing the top cover. If servicing requires power be ON while protective covers are removed, proceed only with extreme caution not to touch exposed areas. Failure to do so can result in serious injury. Heed all WARNINGS - HAZARDOUS VOLTAGE labels.

**INTRODUCTION****SECTION 1****INTRODUCTION**

This section provides an overview of the service manual, lists terminal equipment provided and briefly describes the options and accessories available.

**MANUAL OVERVIEW**

The Service Manual consists of the following sections:

Section 1 - Introduction. This section provides a general overview of the service manual, lists terminal equipment provided and briefly describes the options and accessories available.

Section 2 - Installation. This section provides procedures for installing the terminal. Options, accessories and cabling information are also included in this section.

Section 3 - Strapping. This section provides strapping configuration procedures and status information for the terminal. Also included is a segment on language selection which applies only to the national options.

Section 4 - Preventive Maintenance. This section provides preventive maintenance information for the terminal.

Section 5 - Alignment. This section provides procedures for adjusting the power supply and raster.

Section 6 - Troubleshooting. This section provides procedures for isolating terminal failures to a replaceable assembly or component.

Section 7 - Parts Lists/Repair. This section provides parts lists and repair information for the terminal. This section also provides removal and replacement procedures for the terminal's replaceable parts.

Section 8 - Functional Operation. This section provides a brief functional description of the terminal.

**EQUIPMENT PROVIDED**

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The following equipment and documentation are provided with the terminal:

For HP 2621B:

1. HP 2621B Interactive Terminal with a standard 115V power source configuration.
2. HP 2621B Interactive Terminal Owner's Manual.

For HP 2621B Option 050:

1. HP 2621B Option 050 Interactive Terminal with a standard 115V power source configuration.
2. Thermal Paper.
3. HP 2621B Interactive Terminal Owner's Manual.

**OPTIONS AVAILABLE**

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Options are factory modifications of a standard terminal that are requested by the customer. Available options for the terminal are listed in table 1-1.

Table 1-1 - 2621B Options

OPTION	DESCRIPTION
015	230V, 50Hz Power Source
050	Integral Thermal Printer
001	Finnish/Swedish
002	Norwegian/Danish
003	French
004	German
005	U.K.
006	Spanish
010	National character set and firmware with USASCII keyboard
061	Green CRT
090	Delete pedestal

## ACCESSORIES AVAILABLE

Accessories may be ordered with the terminal or separately from your local Hewlett-Packard Sales and Service Office. Sales and Service Offices are listed at the back of this manual. Terminal accessories are listed in table 1-2.

Table 1-2 - Terminal Accessories

MODEL	HP PART NO.	DESCRIPTION
13242M	13242-60002	European Modem Cable, Male, 5 meters. May be used in place of 40242M.
13242N	13242-60001	U.S. Modem Cable, Male, 5 meters. May be used in place of 40242M.
13242Y	13242-60005	Three-Wire Cable, Male, 5 meters. May be used in place of 40242M for hardwired connection
40242M	40242-60004	RFI Filtering Modem Cable, Male-Male, 5 metres
40242C	40242-60003	RFI Filtering Extender Cable, Male-Female, 5 metres
40242Z	40242-60002	RFI Filtering Modem-Modem Bypass Cable, Male-Female, 5 metres

Note: Use of cables other than the 40242 may cause unacceptable RFI noise.

## SPECIFICATIONS

For terminal specifications, refer to the HP 2621B Interactive Terminal Data Sheet, which is available from your local HP Sales and Service Office.

## INSTALLATION

## SECTION 2

## INTRODUCTION

In addition to procedures for installing the terminal, this section provides instructions for opening and closing the terminal, removing and replacing the mainframe on the support (figure 2-1) and interfacing information.

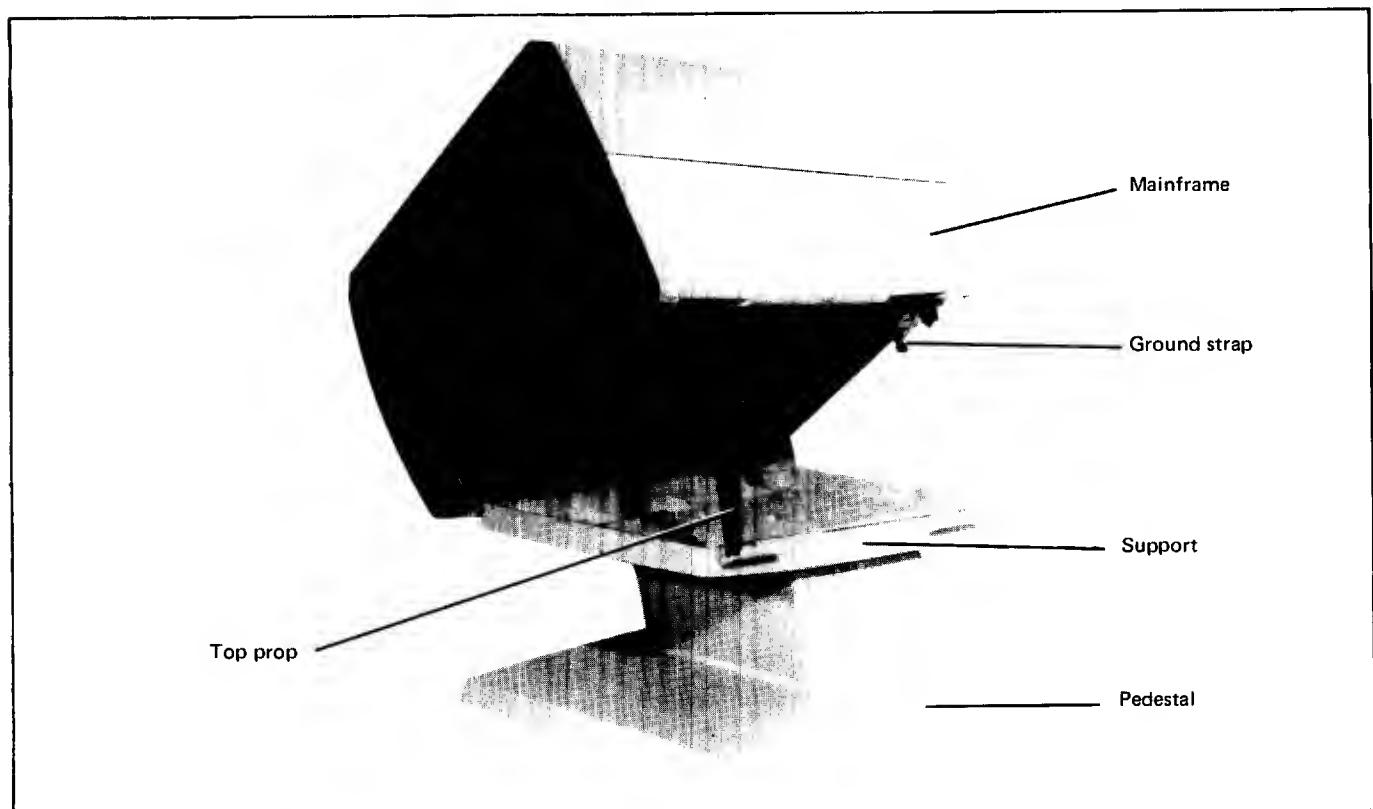


Figure 2-1 Terminal In Half Open Position

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OPENING AND CLOSING THE TERMINAL

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WARNING



Hazardous voltages are present inside the equipment. The procedures must be performed by qualified service personnel only. If possible, remove ac power before opening the terminal or removing the top cover. If servicing requires that power be ON while protective covers are removed, proceed only with extreme caution not to touch exposed areas. Failure to do so can result in serious injury. Heed all WARNING - HAZARDOUS VOLTAGE labels.

## OPENING THE TERMINAL

1. Using a small cross-head screwdriver, loosen the quarter-turn fastener (figure 2-2) at the lower left rear of the terminal. Do not turn the fastener more than a quarter-turn.
2. Hold the pedestal in place with one hand and push forward on the rear of the mainframe to slide the mainframe forward about 1/4-inch on the support. While holding down the pedestal, lift the left side of the mainframe until it tilts approximately 45 degrees and the top prop locks the mainframe in the half-open (service) position.

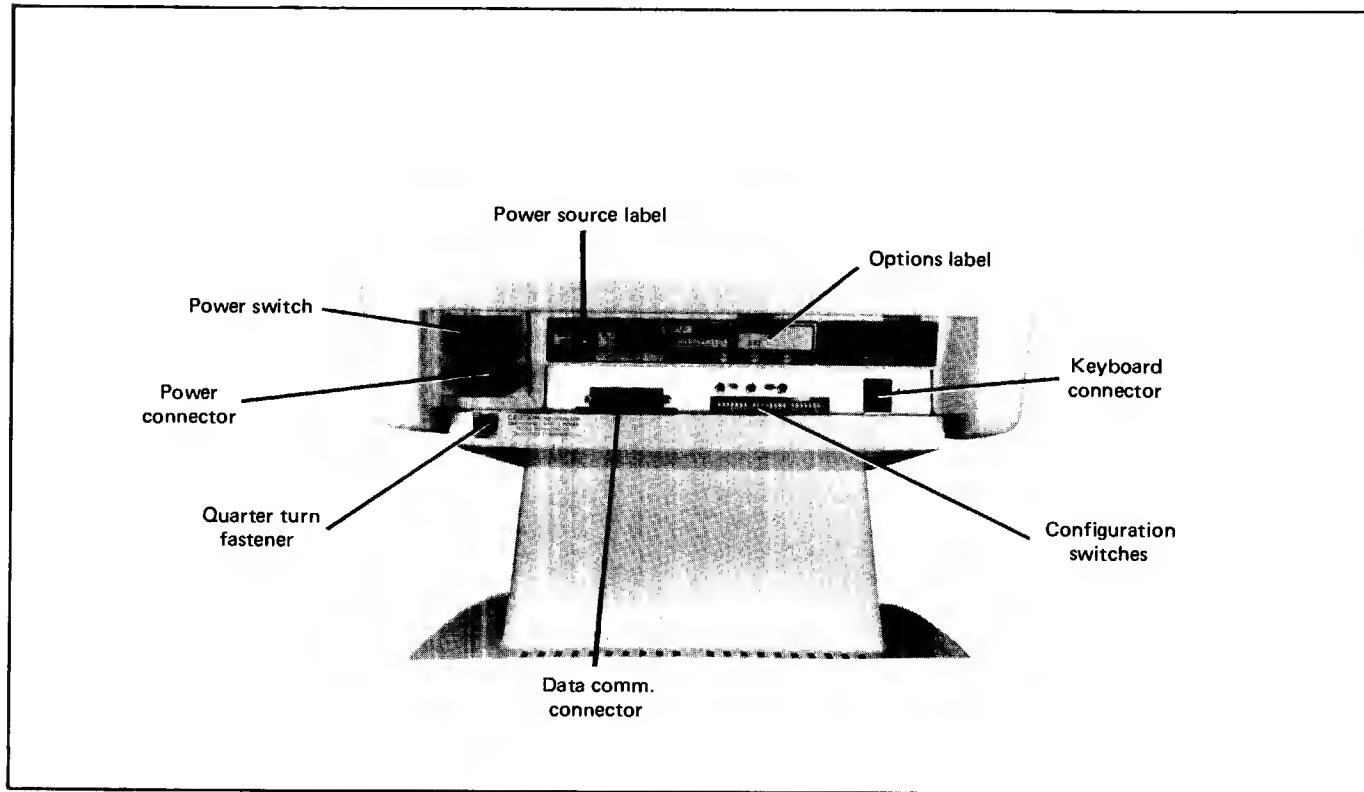


Figure 2-2 Terminal Rear View

**REMOVING THE MAINFRAME FROM THE SUPPORT**

Removal procedures for the 2621B are different from those for the 2621B option 050 (printer). For the 2621B, perform steps 2, 7 and 8; for the 2621B-050, perform steps 1 through 8.

1. On the 2621B-050, remove the top cover from the terminal by loosening the two quarter-turn fasteners at the top of the terminal. Do not turn the fasteners too far.
2. Open the terminal to the half-open (service) position.
3. On the 2621B-050, disconnect the ground strap from the Processor PCA ground lug.
4. Lower the Processor PCA by unsnapping the two-corner snap fasteners which hold it in place (the CRT base cable will disconnect from the processor PCA).
5. On the 2621B-050, disconnect the fan cable from the FAN connector (J1) on the Power Supply PCA and pull it through the mainframe assembly so that it lies on the support.

**CAUTION**

When securing snap-in fasteners, always install each snap-in-grommet into its respective fastening hole before pushing-in on each snap-in plunger. Observe that each snap-in plunger clicks to ensure that the snap-in fastener is fully seated and secured. Failure to do so will result in an insecure assembly which may cause damage or failure to the assembly or terminal.

6. Reinstall the Processor PCA and reconnect the ground strap (do NOT forget to reconnect the CRT base cable to the processor PCA).
7. Free the mainframe from the top prop by squeezing the upper end of the top prop (figure 2-3) while exerting an upward force on the left side of the mainframe.

**WARNING**

Use extreme care when freeing the mainframe from the top prop and pedestal. Failure to do so may result in damage to the terminal or injury to yourself.

8. With the mainframe free of the top prop, slide the mainframe forward an additional 1/4-inch until the right side clears the fixed hinges (figure 2-3) on the right side of the support; then lift the mainframe free of the support.

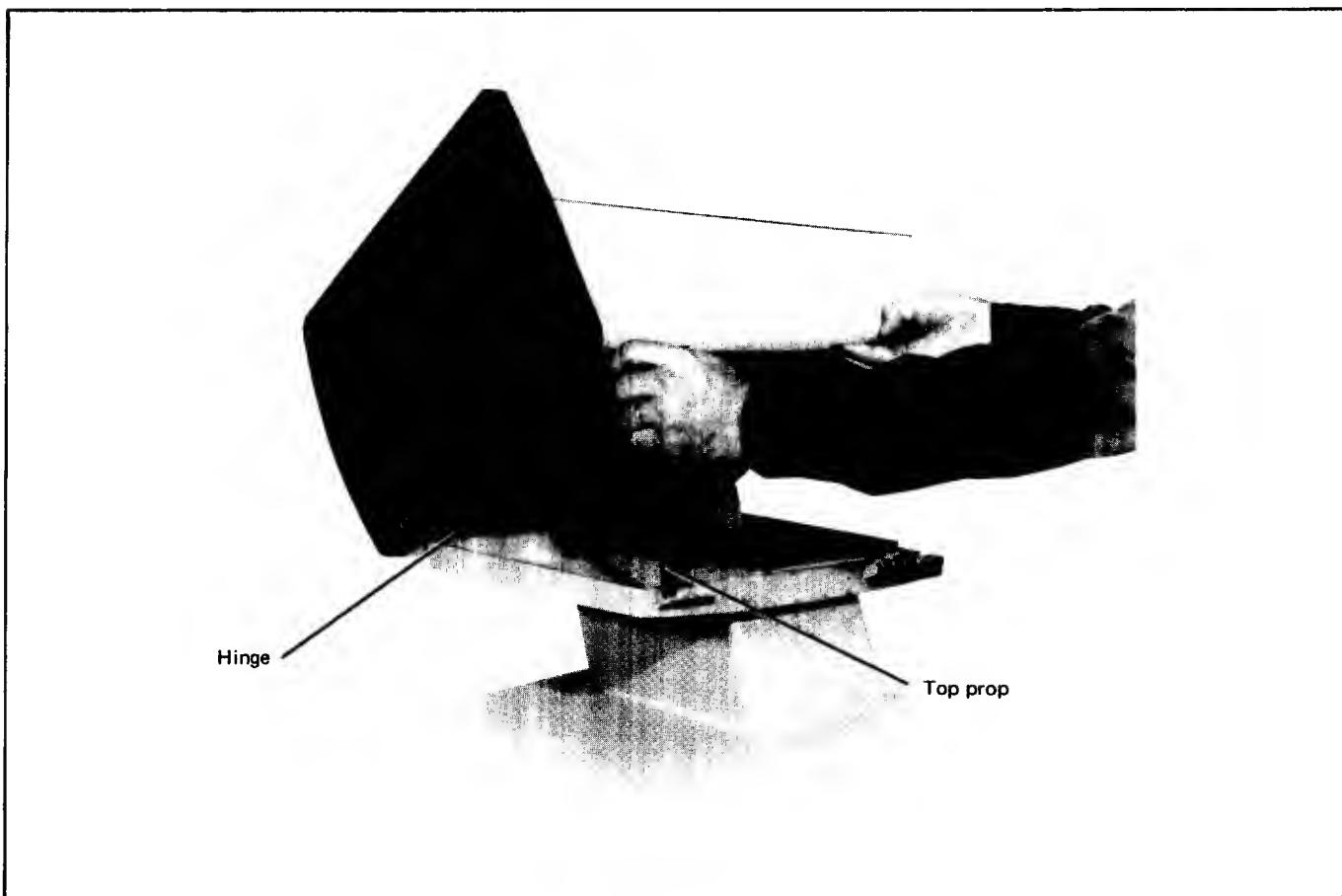


Figure 2-3 Freeing Mainframe From The Top Prop

#### REPLACING THE MAINFRAME ON THE SUPPORT

1. Hold the mainframe above the support in a tilted position with the left side up, to clear the top prop, and the right side down so that the fixed hinges on the right side of the support enter the hinge openings (figure 2-4) along the right lower edge of the mainframe. Then slide the mainframe rearward approximately 1/4-inch to lock the hinges.
2. While guiding the top prop so it enters the top prop opening (figure 2-3) in the lower left edge of the mainframe, lower the left side of the mainframe until the top prop locks the mainframe in the half-open (service) position.
3. On the 2621B-050, make sure the fan cable is routed correctly and seated securely in the support slots and cable clip. Failure to do so may cause abnormal cable wear and possible short circuits.

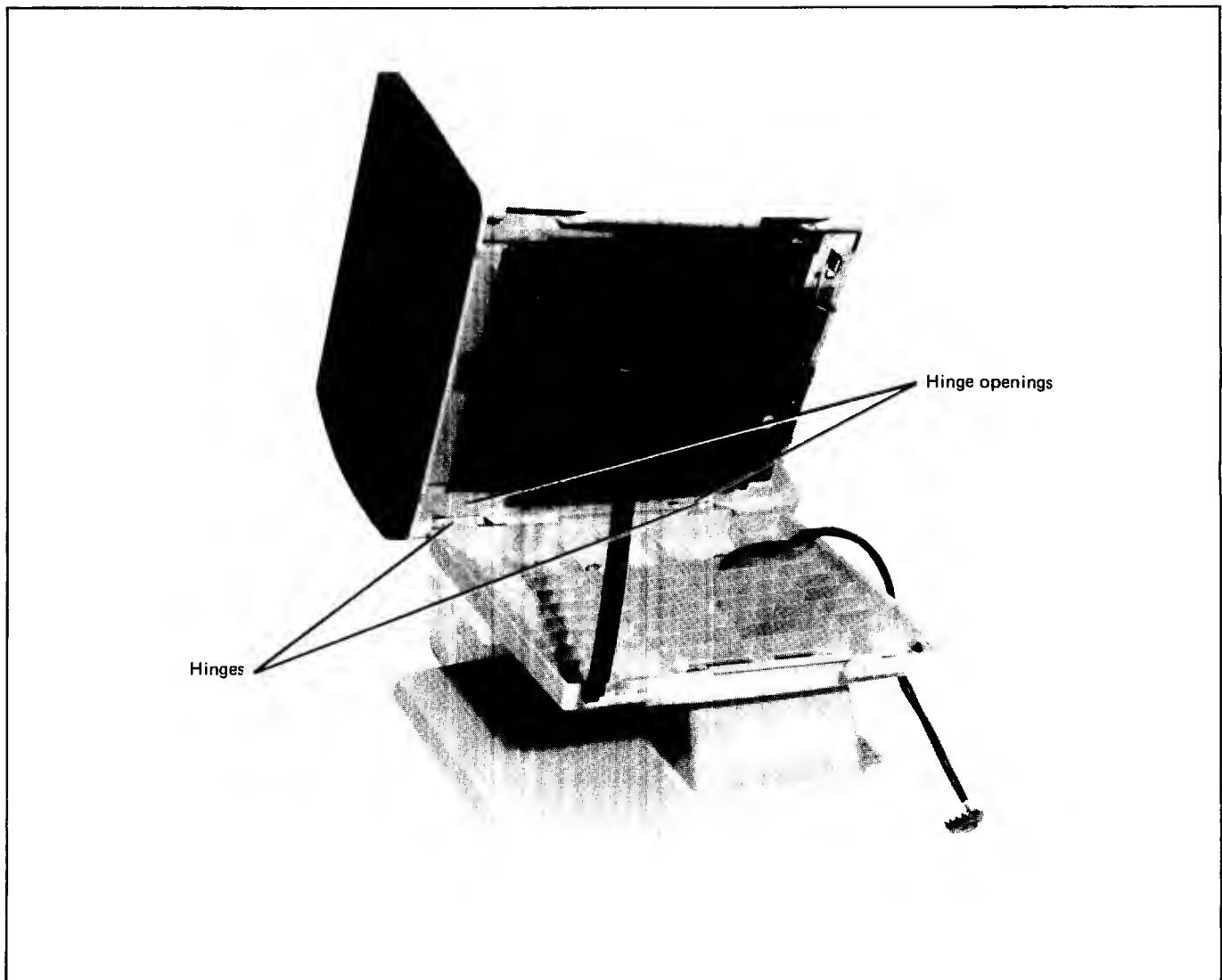


Figure 2-4 - Mating The Hinges To The Hinge Openings

#### CLOSING THE TERMINAL

1. While holding the terminal mainframe with one hand to keep it from falling into the closed position, raise it slightly and squeeze the upper end of the top prop to release the latch. Then lower the mainframe to the closed position.
2. Push on the front of the mainframe to slide it rearward approximately 1/4-inch or until it stops.
3. Use a small cross-head screwdriver to tighten the quarter-turn fastener at the left rear of the terminal. Do not over-tighten it.

## INSTALLING THE TERMINAL

## PROCEDURE

1. Check that the available power source is correct. Refer to the power source and option labels at the rear of the terminal (figure 2-2).

Table 2-1 2621B Power Requirement

OPTION	POWER SOURCE	RATING	FUSE PART NUMBER	SOCKET	FUSE SIZE
STD	115V, 50/ 60Hz	50W, 0.5A	2110-0043	X1	250V, 1.5A
015	230V, 50Hz	50W, 0.4A	2110-0063	X1	250V, 0.75A

Note: The fuse should always be installed in X1.

Table 2-2 2621B Option 050 Power Requirement

OPTION	POWER SOURCE	RATING	FUSE PART NUMBER	SOCKET	FUSE SIZE
015	230V, 50Hz	100W, 1.2A	2110-0083	X1	250V, 2.5A
STD	115V, 50/ 60Hz	100W, 2.4A	2110-0010	X2	250V, 5A

2. Remove the top cover by loosening the two quarter-turn fasteners at the top of the terminal. Do not turn the fasteners too far.
3. Check that the fuse is inserted in the correct set of fuse holders (figures 2-5 and 2-6). For 2621B-050, the Power Supply PCA must be removed to check the fuse.

On the standard 2621B, the power connector used depends on the voltage of the power source. The J2 connector is used for voltages between 100 and 120 volts. The J3 connector is used for voltages between 220 and 240 volts.

On the 2621B-050, only the fuse position is changed to match the source voltage. The X1 socket is used for voltages between 220 and 240 volts. The X2 socket is used for voltages between 100 and 120 volts.

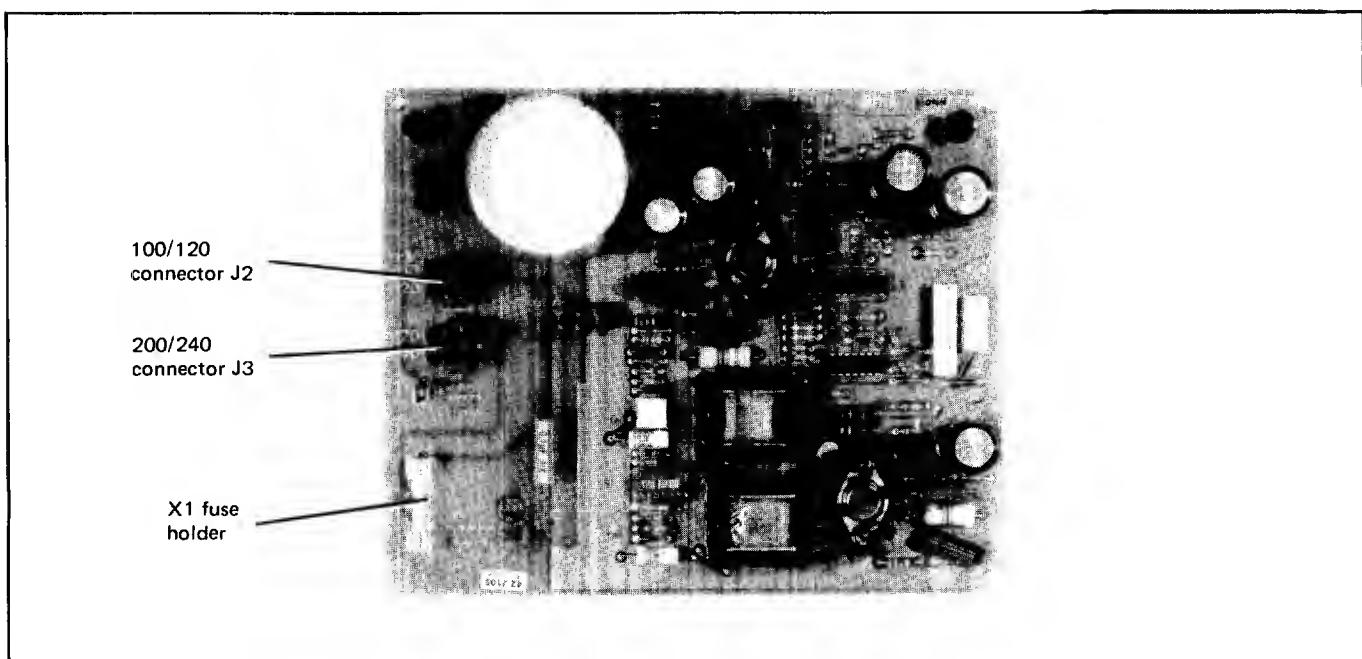


Fig 2-5 2621B Power Supply

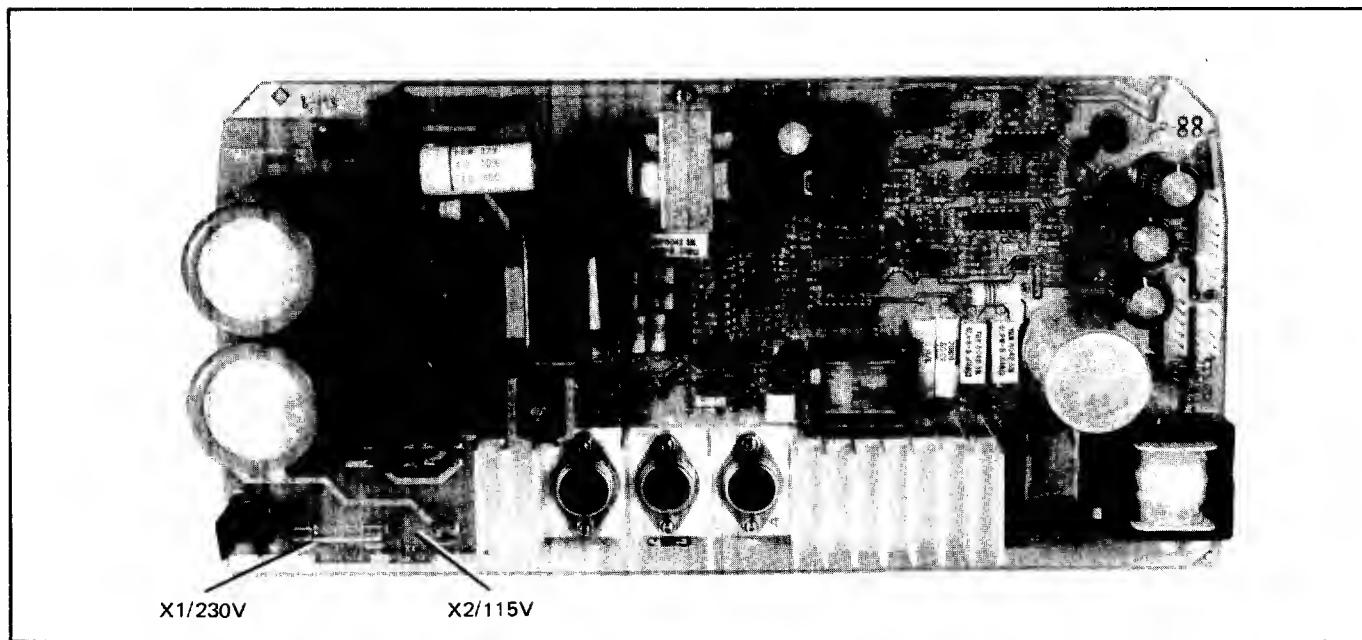


Fig 2-6 2621B Option 050 Power Supply

**CAUTION**

On the standard 2621B, check that the 6-pin transformer cable is connected to the Power Supply PCA connector (J2 or J3) which matches the power source. If a 220 or 240V power source is connected to the 100/120 volt connector, the power supply will be damaged.

4. Position the keyboard in front of the terminal and connect the keyboard cable to the KYBD connector at the lower right rear of the terminal (figure 2-2).
5. If applicable, connect the data communications cable to the DATA COMM connector at terminal rear and tighten the two securing screws at each side of the connector.
6. Connect the power cord to the power connector at the left rear of the terminal, then turn on the power switch and allow time for the terminal to warm up (about 15 seconds).
7. Perform the power supply adjustment procedures and check the raster alignment (refer to the Alignment Section for details).
8. Reinstall the top cover.
9. Perform the terminal self-test (refer to the self-test procedure in the Troubleshooting Section).
10. Configure the straps at the rear of the terminal as desired (refer to the Strapping Section).
11. Enter Configuration mode and configure the terminal as desired (refer to the Owner's manual).

#### THERMAL PRINTER PAPER

---

#### INTRODUCTION

Only Hewlett-Packard thermal printer paper, which is specially processed to prolong print head life, should be used in the 2621B-050 printer, otherwise the equipment warranty and service contract will be void. The reference numbers are:

Thermal printing paper, 24 rolls, blue print - HP Ref. No. 92160A.  
Thermal printing paper, 24 rolls, black print - HP Ref. No. 92160B.

#### PAPER LOADING

To load a paper roll into the printer, perform the following

1. Raise the printer door.
2. Raise the door latch (figure 7-11) and remove the remaining paper and paper core (if any) and rod from the printer mainframe.
3. Remove the rod from the old core and insert the rod through the core of a new paper roll.

Note: One side of the thermal paper is coated with printing material (the glossy side) and it must be installed correctly to produce the print image. See the embossed illustration on the underside of the printer door for correct paper roll installation.

4. With the leading edge of the paper roll facing out (when viewed from the front), place the paper roll and rod into the slotted guides of the housing. Press the paper roll down and toward the rear of the printer until it clicks into place.
5. Feed the leading edge of the paper roll toward the front between the latching frame and the clear plastic tear window. Be careful not to knock the print head because damage may result.
6. Lower the latching frame without locking it into place.
7. Align the paper roll sides with guide-lines embossed on each side of the tear window.
8. Feed approximately 12 inches of paper through the latching frame so that the glue spot is beyond the print head and tear window.
9. Press down on the latching frame until it locks into place with an audible click.
10. Tear off the excess paper using the edge of the tear window as a cutter.
11. Close the printer door securely.

Note: If subsequent print operations appear normal except that no print image appears, the paper may have been installed back-to-front. An image can be printed only on one side of the paper.

## INTERFACING INFORMATION

---

### SIGNAL CHARACTERISTICS

The characteristics for data signals are as follows:

SPACE

MARK

Logic 0 >+3V but <+25V	Logic 1 <-3V but >-25V
---------------------------	---------------------------

## CONTROL AND TIMING SIGNALS

The characteristics for the control and timing signals are as follows:

ON (ACTIVE)	OFF (INACTIVE)
Logic 1 >+3V but <+25V	Logic 0 <-3V but >-25V

## CABLING

Pin-to-pin wiring for three data communication cables is shown in the STRAPPING section of this manual. These cables are specially designed to reduce the level of RFI noise generated by the terminal. Table 2-3 translates the RS232C/CCITT V.24(European equivalent) signal identification code for each signal to the name of the signal.

Table 2-3 RS232C/CCITT V.24 Signal Code-to-name Translation

CODE		NAME
RS 232C	CCITT V.24	
AA	101	Protective Ground
BA	103	Transmitted Data (Data Out)
BB	104	Received Data (Data In)
CA	105	Request To Send
CB	106	Clear To Send
CC	107	Data Set Ready
AB	102	Signal Ground (Common Return)
CF	109	Received Line Signal Detector
SCF	122	Secondary Received Line Signal Detector
DB	114	Transmission Signal Element Timing
DD	115	Receiver Signal Element Timing
SCA	120	Secondary Request To Send
CD	108.2	Data Terminal Ready
CE	125	Ring Indicator
CH	111	Data Signal Rate Selector
DA	113	Transmit Signal Element Timing
x16 Clock In*		Receive Timing
x16 Clock Out*		Transmit Timing
x8 Clock Out*		Transmit Timing

\* These signals do not conform to the RS232C/CCITT V.24 voltage levels.

## CABLE FABRICATION

If you should need to fabricate an extension cable, the parts are available from Hewlett-Packard and are listed below.

Table 2-4 Cable Parts

Cable	8120-1950
RS232C Connector kit 1 Male+1Female	5061-2405
Shrink tubing	0890-0311
Rubber bushing	1251-0352
Wire 24 AWG black	8150-0447

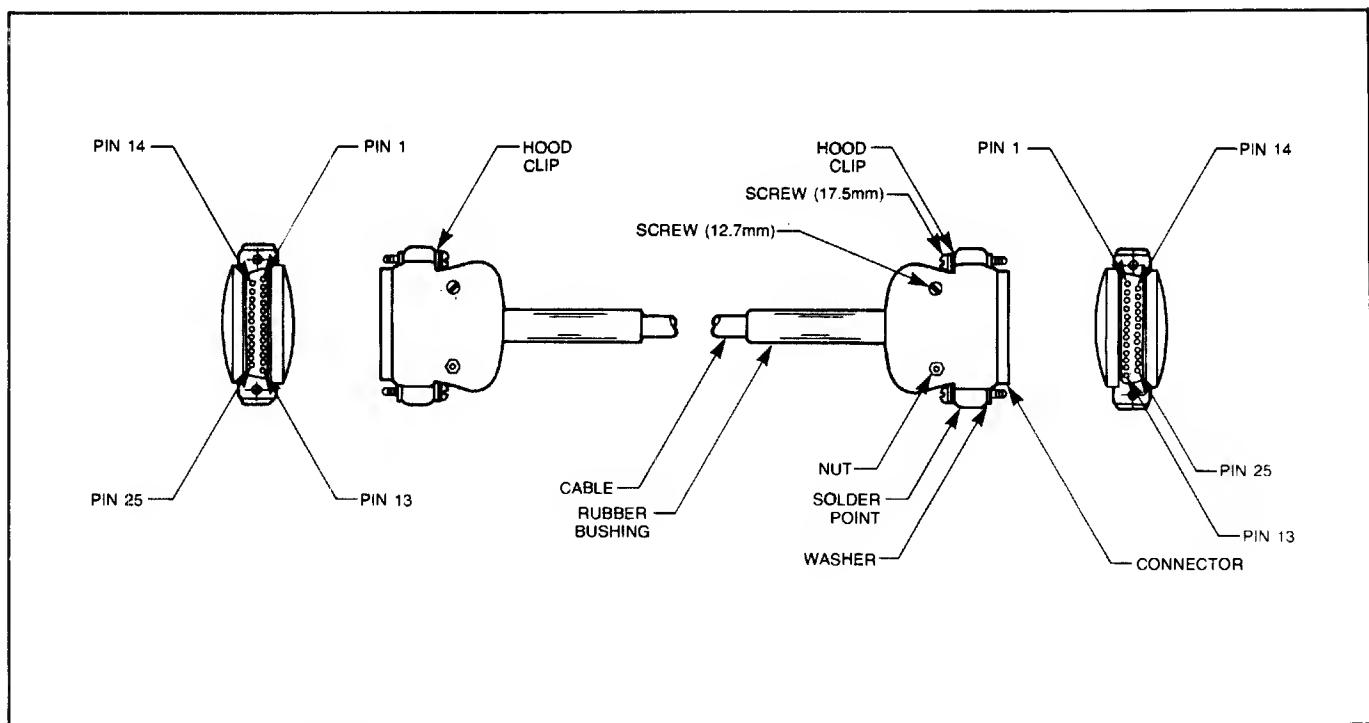


Fig 2-7 Cable Fabrication

Instructions for fabricating a cable are as follows:

1. Slide the rubber bushing over the cable; strip the outer jacket from the end of the cable for a distance of 30 mm. Separate the braided shield from the wires.
2. Strip the ends of the cable wires to be used (see the cable description in the STRAPPING section of this manual) for insertion into pins, and clip off all wires which will not be used at the termination of the outer jacket.
3. Insert each wire to be used into a pin, crimp the pin and insert each pin into the correct hole in the connector (figure 2-7).
4. Strip one end of a 100 mm length of wire (part no. 8150-0447), insert it into a pin and crimp the pin. Insert the pin into pin hole 1 of the connector.
5. Solder the other end of the 100 mm length of wire to the braided shield at the point where the shield exits from the outer jacket of the cable.
6. Break off the cable guide pin to provide more room for the following operation.
7. Slide a 50 mm section of heat shrink tubing (part no. 0890-0311) over the shield, solder the end of the shield flat to the connector, and shrink the tubing.
8. After performing the above operations on each end of the cable, test the cable for continuity and short circuits.
9. Lay the connector and cable end in place on a connector half shell, lay two of the longer (17.5mm) 4-40 screws (each with a hood clip and lockwasher threaded on it) in place at each side of the half shell, then place another connector half shell over it, and secure them together with the two shorter (12.7mm) 4-40 screws.

**STRAPPING****SECTION 3****INTRODUCTION**

This section provides hardware strapping procedures for the terminal. These procedures are carried out on three sets of switches at the rear of the terminal. Terminal status information is included in this section.

**WHY**

Strapping enables selection of terminal display and data transfer characteristics:

## 1. Display characteristics:

- a) Cursor end-of-line wraparound.
- b) Overwrite of existing characters with blanks when the space bar is used.

## 2) Data transfer characteristics:

## a) Terminal/computer handshakes:

- \* Short transfer trigger handshake.
- \* Long transfer warning handshake.
- \* ENQ/ACK handshake.
- \* XON/XOFF handshake.

## b) Data Speed Select

## c) Baud rate.

## d) Type of parity.

## e) Echo

## f) Return key function.

## g) National characters set (options 001 to 006 or 010 only).

## HOW

Strap selections are made using switches on the rear of the terminal. These switches determine the configuration at power-on, every time you select the SWITCHES function on the keyboard, and after a terminal reset.

## PROCEDURE

Setting a switch to the UP (1) or DOWN (0) position enables or disables the corresponding function.

## SWITCH SETTINGS

Figure 3-1 below shows the 2621B configurations switches as seen from the rear of the terminal.

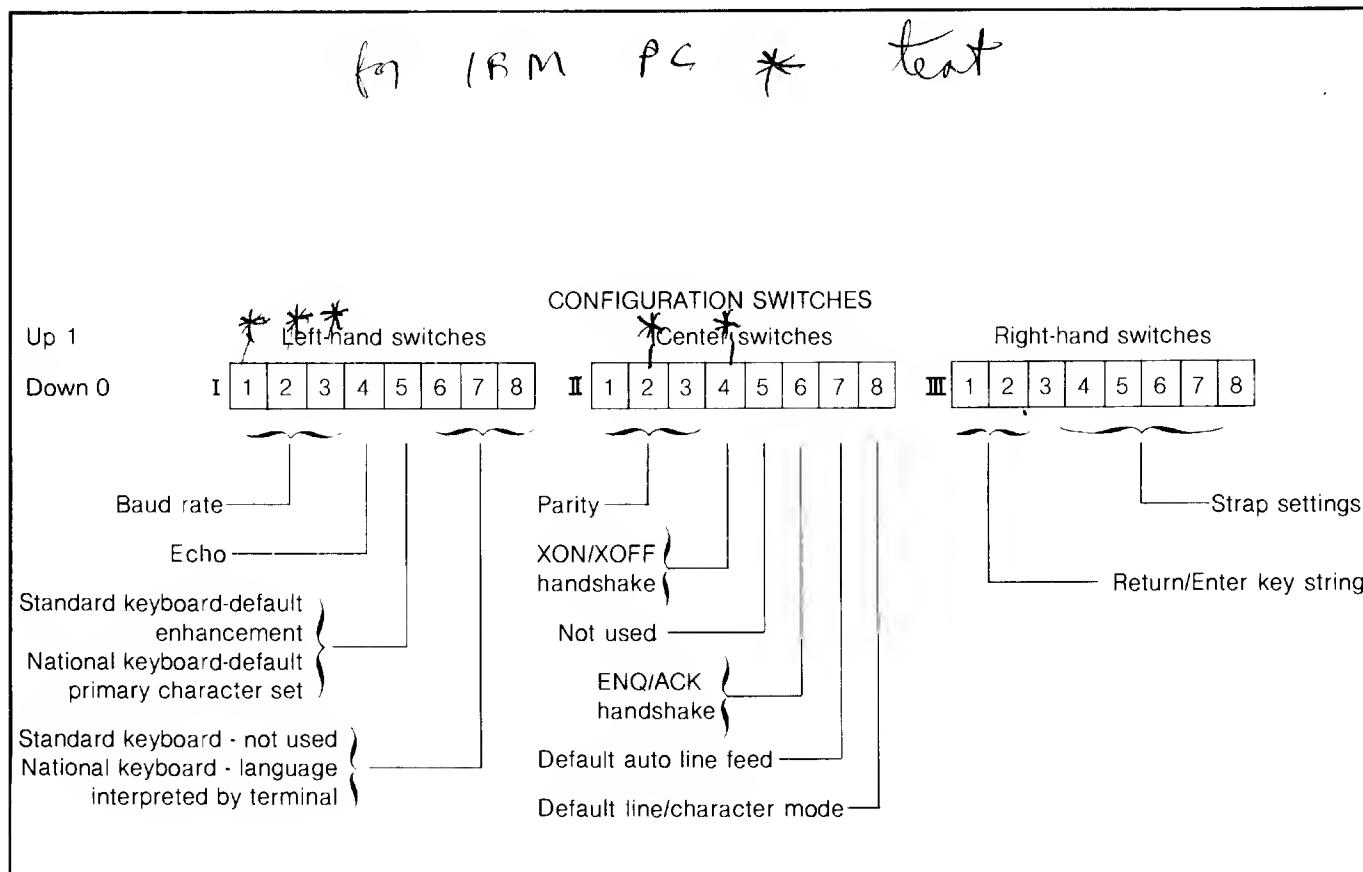


Figure 3-1 2621B Configuration Switches

**Baud Rate**

I-1	I-2	I-3	Baud Rate
0	0	0	110*
1	0	0	150
0	1	0	300
1	1	0	600
0	0	1	1200
1	0	1	2400
0	1	1	4800
1	1	1	9600

\* 2 stop bits

**Echo**

I-4 = 1 Local echo of the data typed on the keyboard.

I-4 = 0 No local echo.

**Enhancement**

1. If the 2621B has no option 001-006 or 010 fitted:

a) I-5 = 1 At power-on, the display enhancement selected is inverse video.

b) I-5 = 0 At power-on, the display enhancement selected is underline.

2. If the terminal has one of options 001-006 or 010 fitted (National Character firmware):

a) I-5 = 1 At power-on or after a hard reset, the terminal will be configured to use the USASCII character set as the primary character set.

b) I-5 = 0 At power-on or after a hard reset, the terminal will be configured to use the National Character Set defined on switches

I-6, 7 and 8 as the primary character set.

### National Character Sets Language

---

These switches are ignored if the terminal has no National Character Set options (001-006 or 010).

I-6	I-7	I-8	Character Set
0	0	0	USASCII
1	0	0	Swedish/Finish
0	1	0	Norwegian/Danish
1	1	0	French (QWERTY keyboard)
0	0	1	French (AZERTY keyboard)
1	0	1	German
0	1	1	English
1	1	1	Spanish

---

### Parity

---

II-1	II-2	II-3	Parity
0	0	0	None (1)
1	0	0	None (0)
0	1	0	8 Bits mode (used with the National Character set options)
0	0	1	Even
1	0	1	Odd
1	1	1	Continuous self test*

\* Refer to  
TROUBLESHOOTING  
section

### Handshake

---

ENQ/ACK Handshake - This type of handshake may be used to ensure that the terminal has an empty input buffer before the host computer transmits more data. When this strap is enabled, an acknowledge signal (ACK) is transmitted by the terminal each time an enquiry signal (ENQ) is received from the host computer. Any data contained in the buffer is processed before the ACK signal is transmitted.

When this strap is disabled, any enquiry signal (ENQ) encountered from the host computer is treated as a normal data character. No acknowledge signal (ACK) is generated.

XON/XOFF - This handshake protocol allows the terminal to signal the host computer to stop sending data and, subsequently, to resume sending data as the input buffer fills and empties.

When this strap is enabled, the input buffer fills to within approximately 60 bytes of its capacity. At this point, the terminal sends a Transmit Off signal (XOFF) to cause the host computer to stop transmitting data. When the buffer has emptied below one quarter of its capacity, the terminal sends a Transmit On signal (XON) which causes the host computer to resume data transmission. This process is repeated until the current data transfer operation is completed. When disabled, no XON/XOFF handshake occurs.

Note that the XON signal is represented by a DC1 (CTRL Q) character transmission. The XOFF signal is represented by a DC3 (CTRL S) character transmission.

II-4 = 1	XON(DC1) - XOFF(DC3)	protocol enabled
II-4 = 0	XON - XOFF	protocol disabled
II-6 = 1	ENQ/ACK	protocol enabled
II-6 = 0	ENQ/ACK	protocol disabled

### Auto Line Feed

---

II-7 = 1	Auto Line Feed enabled
II-7 = 0	Auto Line Feed disabled

### Line Mode

---

When Line Mode is enabled, data entered into display memory appears on the screen but is not transmitted across the data communications link until after the [ENTER] or [RETURN] key is pressed and computer has responded according to the DC1/DC2 protocol (see G and H straps).

II-8 = 1 Line Mode enabled

II-8 = 0 Line Mode disabled

Refer to the Owner's Manual for more information about the amount of data transmitted in Line Mode.

#### Terminator

---

Either one or two ASCII characters can be selected to be transmitted to the computer each time the [RETURN] key is pressed. The available settings are:

III-1	III-2	RETURN key function
0	0	CR
1	0	CR + LF
0	1	CR + ETX
1	1	CR + EOT

---

#### Data Rate Selector

---

III-3	Data Rate Signal (RS232C CH line; CCITT V.24 111 line)
1	LOW
0	HIGH

---

#### Data Transfer Operations

---

The HP 2621B provides three kinds of data transfer operations: Long Transfer in Line Mode, Long Transfer in Character Mode, and Short Transfer.

Long Transfer, A data transfer operation initiated via Line Mode the [ENTER] key while the terminal's Line Mode strap is enabled.

**Long Transfer,** A data transfer operation initiated via Character Mode the [ENTER] key while the terminal's Line Mode strap is disabled.

**Short Transfer** A data transfer operation involving:

1. Cursor Sensing.
2. Terminal Status.
3. f1 through f8 functions.
4. Completion status indicator (S, F or U).
5. Ec d initiated transfer.

Depending on the state of the g and h straps, one of three subsets of the handshake protocol is used by the terminal, as shown in figure 3-2

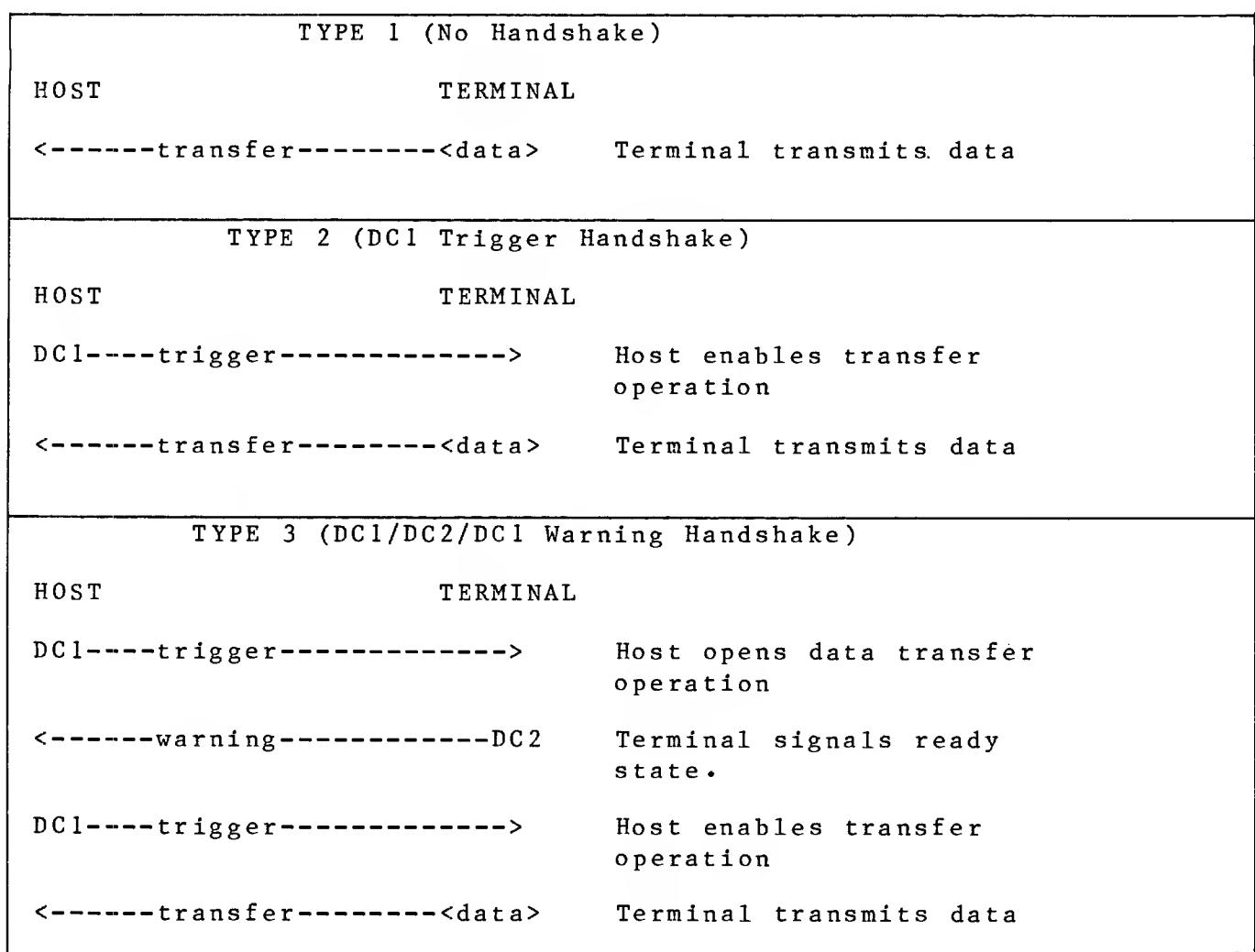


Figure 3-2 Available Handshake Modes

Table 3-1 DC1/DC2 Handshake Protocol Strapping Effects

		Transfer Category		
III-4 (H)	III-5 (G)	Long (Line Mode)	Short	Long (Character Mode)
0	0	Type 3	Type 2	Type 1
1	0	Type 1	Type 2	Type 1
0	1	Type 3	Type 3	Type 3
1	1	Type 1	Type 1	Type 1

**Cursor Wrap-around**

III-6 = 1 At the end of a line, the cursor does not move automatically to the next line (no wrap-around).

III-6 = 0 At the end of a line, the cursor moves to the next line (wrap-around).

**Space Overwrite**

When this strap is enabled, the Space Overwrite (SPOW) latch can be turned on by [RETURN] and turned off by [ home up ], a Line Feed or [TAB]. When the SPOW latch is on, the space bar causes the cursor to move to the right along the current line without overwriting existing characters. When the SPOW latch is off, the space bar causes an overwrite of blank (space) characters as the cursor moves along the current line.

When this strap is disabled, the SPOW latch is not accessible.

III-7 = 1 Spaces typed on the keyboard will move the cursor forward without overwriting existing characters.

III-7 = 0 Spaces typed on the keyboard will move the cursor forward, overwriting existing characters.

**Escape Sequence Transmission**

Enabling this strap allows the terminal to send keyboard escape sequences to the computer. If the terminal is set for remote, full duplex operation, certain terminal keys will send their equivalent escape sequences to the computer when pressed. The [CURSOR UP] key for example will not move the cursor up but will instead send EcA to the computer. A list of terminal escape sequences is given in the 2621B Owner's Manual.

III-8 = 1 Escape sequences generated by function keys  
are transmitted.

III-8 = 0 Escape sequences generated by function keys  
are not transmitted.

#### CHANGING THE CONFIGURATION

The configuration may be modified via the configuration switches, followed by either a power-on, hard reset or "Switches" function (Shift and [Home Down] keys pressed together).

The state of the Inverse Video/Underline, Auto Line Feed, Line Mode and Remote function may be temporarily changed from the keyboard by pressing the shift key and the corresponding soft key together. An asterisk (\*) is displayed in the soft key label when the function is enabled.

Note that after a power-on or a hard reset, the terminal is always in Remote mode.

#### INTERFACING TO HP SYSTEMS

---

Recommended datacomm configurations and suggested cables to connect the 2621B to a variety of HP systems is contained in the "2621B Configuration And Cabling Guide" (HP part no 02620-90095).

RFI filtering cables for connection to systems are detailed below.

##### 40242M: RFI FILTERING MODEM CABLE - 5m (15 ft)

This is a straight through pin-to-pin shielded cable, that connects all the pins that correspond to a signal on the 2621B. It terminates in a male RS232C connector and is typically used for connecting the 2621B to a modem (or to a system that looks like a modem).

The characteristics of the 40242M cable are:

Male-to-male, RS232C, 5 m (15 ft) long, 12 wire shielded with built-in RFI protection.

## Pins Connected

1	1 (shield)
2	2
3	3
4	4
5	5
6	6
7	7
8	8
14	14
15	15
20	20
23	23
24	24

The male connector that plugs into the 2621B terminal is next to the RFI filter.

## 40242C: RFI FILTERING EXTENDER CABLE - 5m (15 ft)

The 40242C is similar to the 40242M cable, except that it ends in a female RS232C connector. i.e. it simply brings out the terminal back panel connector out five meters. Its main function is to provide RFI filtering to those configurations where the system would otherwise be plugged via some cable directly into the terminal's back panel connector.

The main characteristics of the 40242C cable are:

Male-to-female, RS232C, 5 m (15 ft) long, 12 wire shielded with built in RFI protection.

## Pins Connected

M	F
---	---

1	1 (shield)
2	2
3	3
4	4
5	5
6	6
7	7
8	8
14	14
15	15
20	20
23	23
24	24

## 40242Z: RFI FILTERING MODEM BYPASS CABLE

The 40242Z makes the 2621B look like a modem (DCE). It is used with the 12966 HP 1000 interface card, which has an option allowing the system to be plugged into a modem.

The main characteristics of the 40242Z cable are:

Male-to-female, RS232C, 5 m (15 ft) long, 12 wire shielded with built in RFI filter (only 7 wires are used).

## Pins Connected

M	F
---	---

1	1 (shield)
2	3
3	2
[ - 4	8
[ - 5	
6	20
7	7
8	4 -] 5 -]
20	6

Note: Pins 4 and 5 are connected  
together (in both connectors)

## THERMAL PRINTER (2621B OPTION 050)

The configuration straps on the printer PCA are factory-set and only need to be checked if the PCA is changed.

The check procedure is as follows:

1. Turn off terminal power, disconnect the power cord and remove the top cover.
2. Locate the strapping switch on the printer PCA.
3. Check, and if necessary, change the strap settings. Refer to figure 3-3 or figure 3-4 as applicable.
4. Replace the top cover, reconnect the power cord and switch on the terminal.

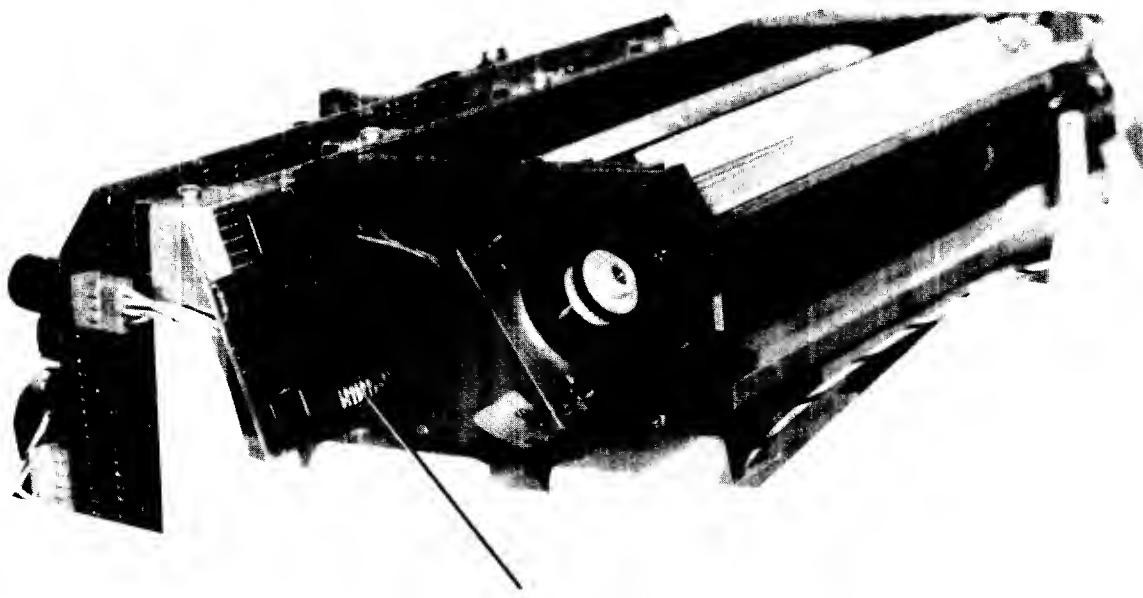


Figure 3-3 Printer PCA Strap Setting - when equipped with  
1818-0763 character ROM

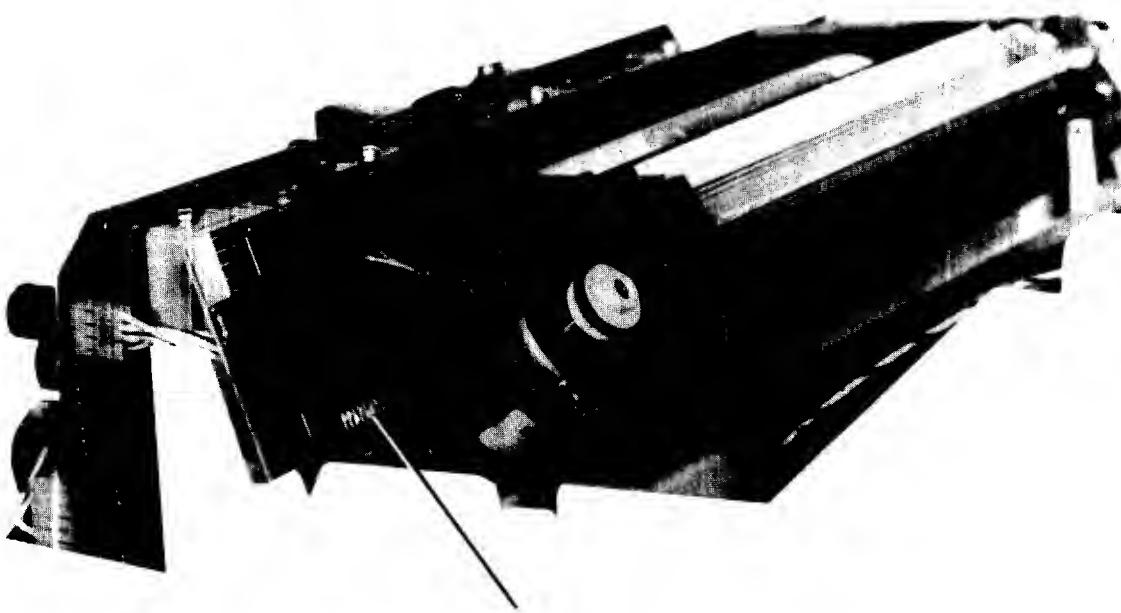


Figure 3-4 Printer PCA Strap Setting - when equipped with  
1818-0981 character ROM

## TERMINAL STATUS

## WHY

Terminal status provides a quick check of the terminal's display memory size, switch settings, and terminal errors.

## HOW

Terminal status is obtained by performing a terminal self-test or by sending an escape code sequence from the computer to the terminal. In response to status requests the terminal returns an escape code sequence, followed by seven status bytes, followed by a terminator.

The seven status bytes (bytes 0-6) are shown below the terminal self-test pattern (figure 3-5 and figure 3-6). The status information is contained in the lower four bits of each byte. The upper four bits of each byte are set so that the byte will have the value of an ASCII character. Each byte can be interpreted as one of 16 characters (see table 3-2).

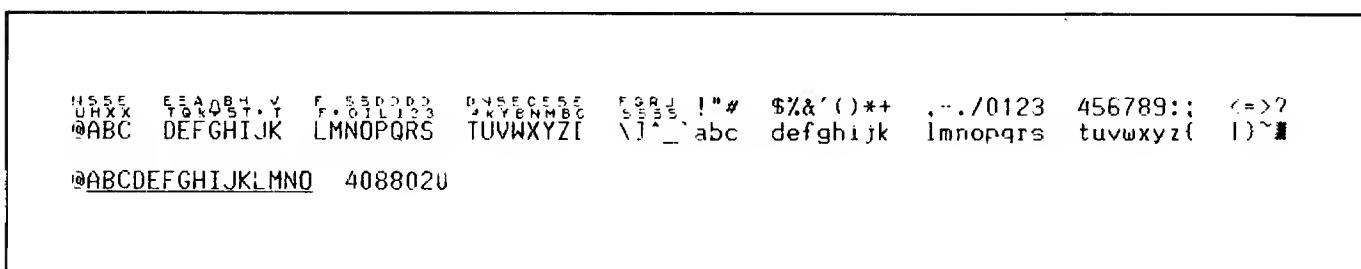


Figure 3-5 Test Pattern - no national character set option

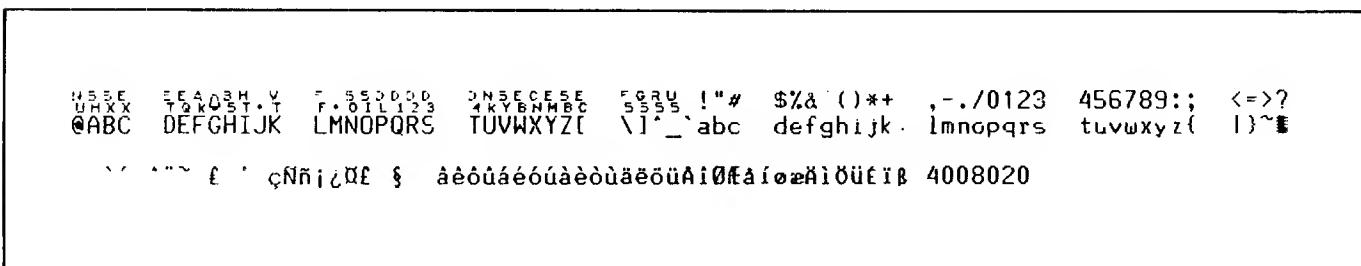


Figure 3-6 Test Pattern - national character set option  
(001-006 or 010)

Table 3-2 ASCII Status Character

ASCII CHARACTER	BINARY
0	0011 0000
1	0011 0001
2	0011 0010
3	0011 0011
4	0011 0100
5	0011 0101
6	0011 0110
7	0011 0111
8	0011 1000
9	0011 1001
:	0011 1010
;	0011 1011
<	0011 1100
=	0011 1101
>	0011 1110
?	0011 1111

**WHEN**

Terminal status should be requested each time the terminal's configuration is changed.

**PROCEDURE**

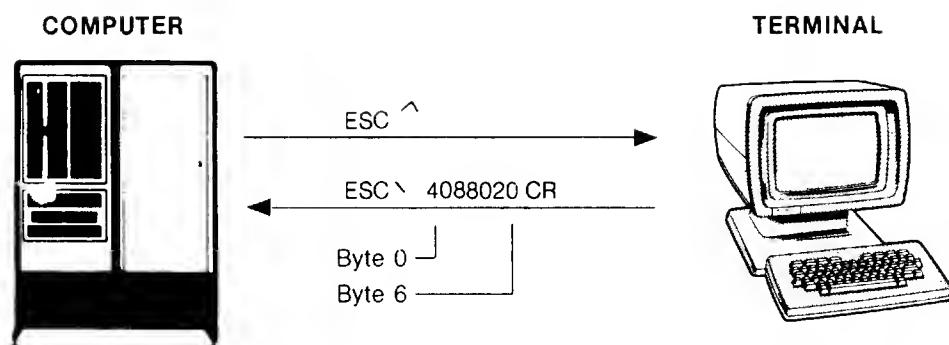
Request terminal status as follows:

1. Perform terminal self-test (refer to the troubleshooting Section).
2. If the terminal is connected to a computer, send the following escape sequence: Ec^

The terminal responds with an Ec\ and seven status bytes followed by a terminator (see figure 3-7).

Note: A DC1 may be required, depending on the block protocol selected (see strapping switches G and H).

3. Interpret terminal status (test pattern or status response). Make sure that terminal status matches terminal configuration. Figure 3-8 shows how to interpret the terminal status.



BYTE	ASCII	BINARY	STATUS
0	4	0011 0100	4096 bytes of display memory
1	0	0011 0000	Function keys not transmitted Space overwrite latch disabled Cursor wrap around enabled
2	8	0011 1000	Strap g (closed) Strap H (open)
3	8	0011 1000	Upper and lower case Character mode No auto line feed Terminal type
4	0	0011 0000	Cursor sense not pending Soft key not pending ENTER key not pending
5	2	0011 0010	No data comm errors Last Self Test OK
6	0	0011 0000	Device Completion not pending

Figure 3-7 Terminal Status Example

## BYTE 0 - DISPLAY MEMORY SIZE

8	7	6	5	4	3	2	1
0	0	1	1	0	1	0	0

↑  
4096

The amount of display memory (4096 bytes) available in the terminal.

## BYTE 1 - CONFIGURATION SETTINGS (STRAPS A, B, C)

8	7	6	5	4	3	2	1
0	0	1	1	0	1/0	1/0	1/0

Strap C  
(End-of-Line Wraparound)  
1 = Disabled (C = open)  
0 = Enabled (c = closed)

Strap A  
(Escape Function Transmission)  
1 = Enabled (A = open)  
0 = Disabled (a = closed)

Strap B  
(Space Overwrite Latch)  
1 = Enabled (B = open)  
0 = Disabled (b = closed)

## BYTE 2 - CONFIGURATION SETTINGS (STRAPS G, H)

8	7	6	5	4	3	2	1
0	0	1	1	1/0	1/0	0	0

Strap H  
1 = Disabled (H = Open)  
0 = Enabled (h = closed)

Strap G  
1 = Disabled (G = open)  
0 = Enabled (g = closed)

## BYTE 3 - LATCHING FUNCTION KEYS

8	7	6	5	4	3	2	1
0	0	1	1	1	1/0	1/0	1/0

Terminal Type (2621)

CAPS LOCK

1 = upper case only  
0 = upper & lower case

AUTO LF

1 = auto LF  
0 = no auto LF

LINE MODE

1 = line mode  
0 = character mode

## BYTE 4 - TRANSFER PENDING FLAGS

8	7	6	5	4	3	2	1
0	0	1	1	0	1/0	1/0	1/0

ENTER Key Pending

1 = yes  
0 = no

Cursor Sense Pending

1 = yes  
0 = no

Function Key Pending

1 = yes  
0 = no

## BYTE 5 - ERROR FLAGS

8	7	6	5	4	3	2	1
0	0	1	1	0	0	1/0	1/0

Self Test

1 = no error  
0 = error

Data Comm

1 = parity or buffer  
overflow error  
0 = no error

## BYTE 6 - DEVICE TRANSFER PENDING FLAGS

8	7	6	5	4	3	2	1
0	0	1	1	0	0	1/0	0

Device Completion

Pending  
1 = yes  
0 = no

Figure 3-8 Terminal Status Bytes (Continued)

## TPM (PRINTER) PREVENTIVE MAINTENANCE

## SECTION 4

## WHY

To ensure quality printing and to prolong optimum performance of the TPM (Thermal Printer Mechanism).

## HOW

Follow the preventive maintenance steps as described in the "PROCEDURE" paragraph below.

## WHEN

TPM preventive maintenance should be performed each time thermal paper is replaced.

## PROCEDURE

To maintain good print quality and to prolong TPM performance, observe the following:

1. Always replace thermal paper with HP thermal paper, product no. 92160A (blue printing) or product no. 92160B (black printing). If Hewlett-Packard's thermal paper is not used, the equipment warranty and service contract will be void.
2. Install thermal paper with printing (glossy) side facing thermal print head (Refer to Installation Section for details).

## CAUTION

The print head may be damaged if knocked.

**ALIGNMENT****SECTION 5****INTRODUCTION**

Alignment procedures for the terminal consist of adjustment of the power supply output and raster alignment.

**WARNING**

Power Supply contains exposed high-voltage components. Use extreme caution and only touch the components detailed in the following sub-sections. Failure to exercise care can cause serious injury.

**POWER SUPPLY ADJUSTMENT****WHY**

To ensure that the power supply is generating the voltages required to enable correct operation of all terminal circuits.

**HOW**

Adjustment of the +5V power source also adjusts the +12V power source as it uses the +5V source as a reference. The -12V source is not adjustable. On the 2621B option 050, the +5V adjustment also affects the +16.1V output.

**WHEN**

Power supply adjustment should be checked at installation and whenever the terminal is not operating properly.

**EQUIPMENT REQUIRED**

- 
- 1. A 20 000 ohms/volt voltmeter with a fine voltage probe.
- 2. A small insulated Phillips (i.e. cross-head) screwdriver.
- 3. Alignment tool 8730-0016, or equivalent.

**PROCEDURE**

1. Turn off terminal power.
2. Loosen the two quarter-turn fasteners securing top cover to mainframe. Remove the top cover. Do not over-loosen the fasteners.
3. Turn on the terminal power.

**CAUTION**

Do not short together exposed Power Supply parts while checking the Power Supply voltages. Otherwise Power Supply could be damaged.

4. Using a 20 000 ohms/volt voltmeter, check the Power Supply PCA voltages (table 5-1 and figure 5-1 or 5-2) for accuracy. A fine-tipped voltage probe can be easily inserted through the holes in the cable connector (J5).
5. Adjust the +5V potentiometer (figure 5-1 or 5-2) until the +5V and +12V (or +16.1V for 2621B option 050) sources are within tolerance. If they cannot be adjusted to be within tolerance or if the -12V source is out of tolerance, refer to the Troubleshooting Section.

Table 5-1 Power Supply Test Points

Test Point	Signal	Voltage :
J5-1	+5V	+5(+-.2)VDC :
NO PIN	-	- :
J5-3	+5V	+5(+-.2)VDC :
J5-4	+12V	+12(+-.3)VDC :
J5-5	RETURN	- :
J5-6	RETURN	- :
J5-7	PWR ON/FAIL	+4.5(+.5,-1)VDC :
J5-8	-12V	-12V(+-.5)VDC :
*J4-1	+16.1V	+16.1(+-.5)VDC :
<hr/>		:
* 2621B option 050 only		:

6. Replace the top cover on the terminal and tighten the two quarter-turn fasteners (do not overtighten the fasteners).

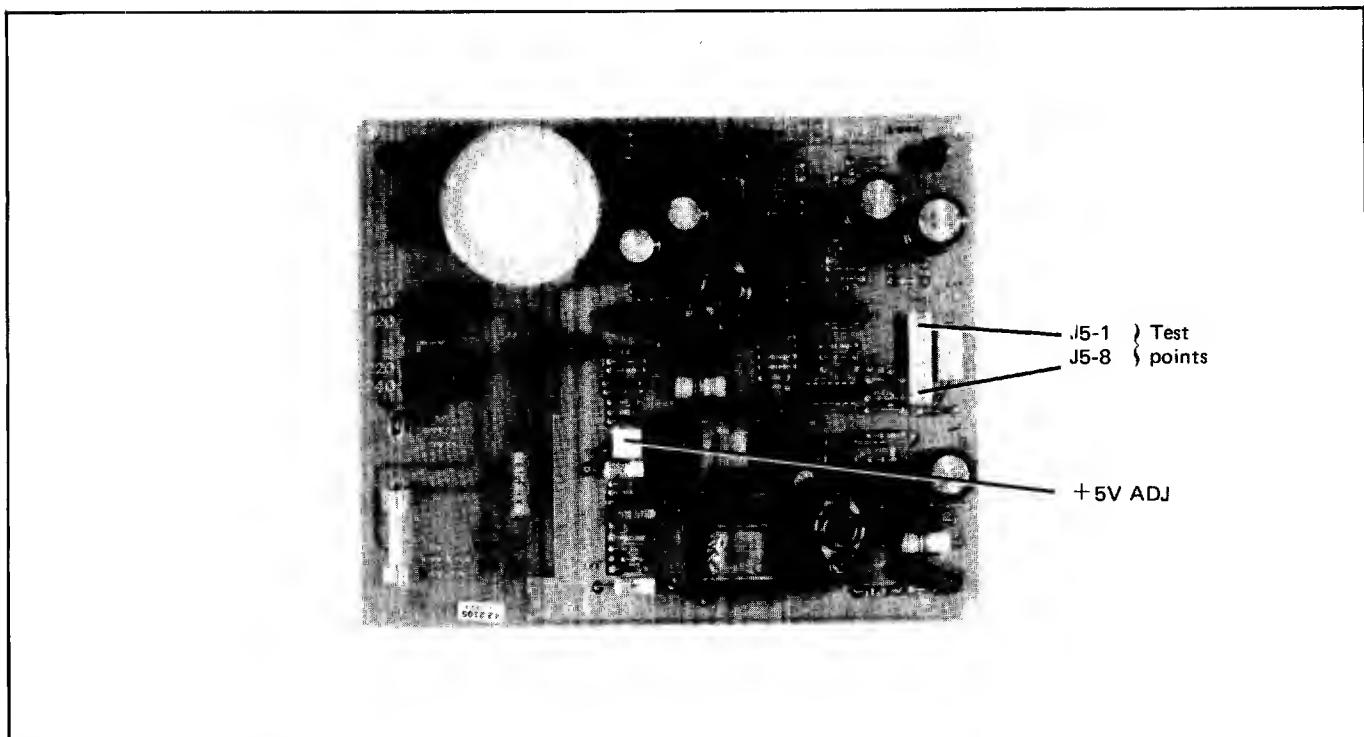


Figure 5-1 2621B Test Points And +5V Adjustment Locations

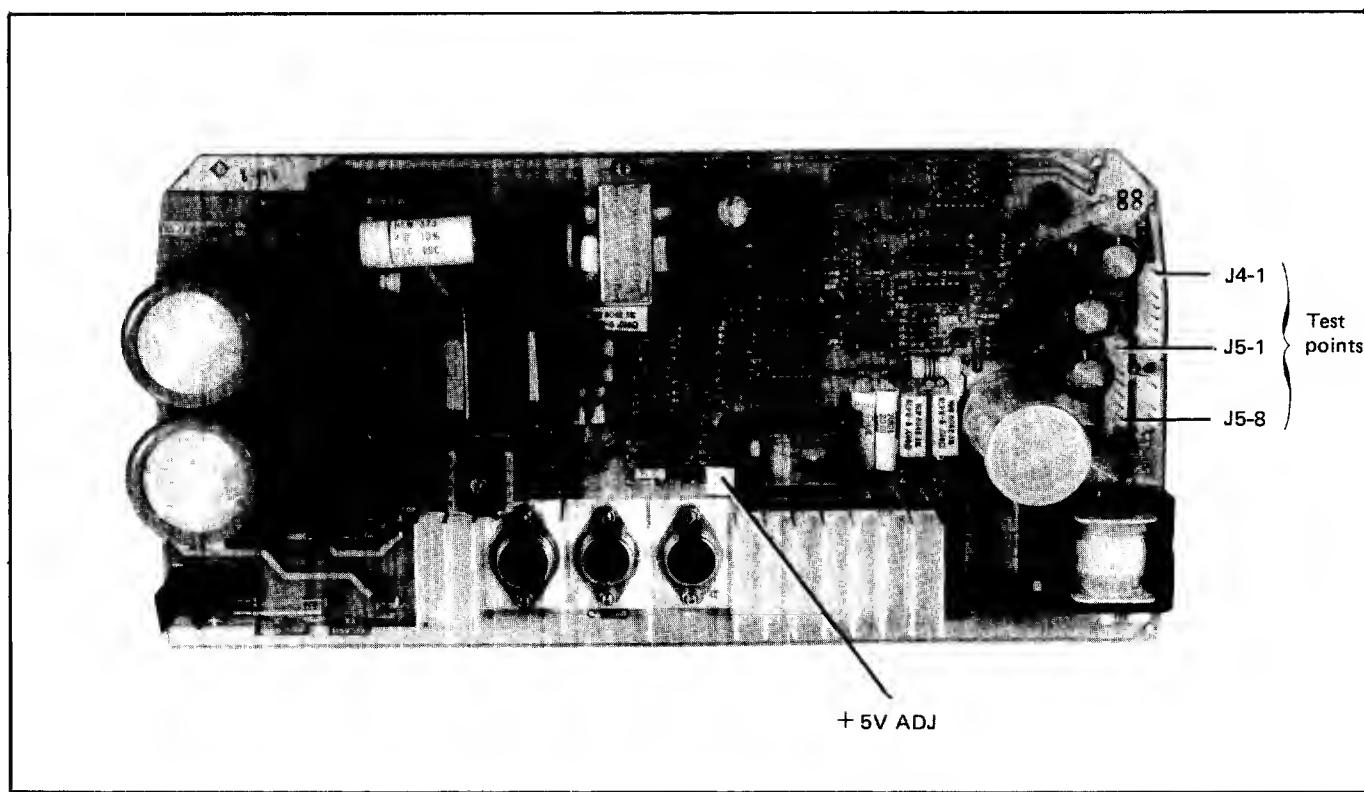


Figure 5-2 2621B Option 050 Test Points And +5V Adjustment Locations

**RASTER ALIGNMENT****WHY**

This procedure enables the following display adjustments:

1. Centers the display on the screen in the horizontal plane.
2. Expands or contracts the display in the horizontal plane.
3. Expands or contracts the display in the vertical plane.
4. Focuses the beam for display clarity.
5. Adjusts for desired display brightness.
6. Adjusts tilt out of the display.

**HOW**

With a display on the screen, the HEIGHT, FOCUS, and BRIGHT adjustments at the rear of the terminal, the width and CENTER adjustment on the processor PCA, and the CRT yoke assembly are adjusted for the desired effects.

**WHEN**

Raster alignment can be performed anytime the display is considered unsatisfactory. It should be checked at installation and whenever the Processor PCA is replaced.

**EQUIPMENT REQUIRED**

1. A small insulated Phillips-head (i.e. cross head) screwdriver.
2. Alignment tool 8730-0016.

**PROCEDURE**

1. Fill a portion of the display screen with a single letter, such as "H".
2. Adjust the HEIGHT adjustment to expand or contract the display in the vertical axis, as desired.
3. Adjust the FOCUS adjustment for uniform clarity across the screen.
4. Adjust the BRIGHT adjustment for the desired brightness.
5. Switch the terminal off and open it to the half open (service)

position. Disconnect the ground strap from the PCA's ground lug. Pull free the two snap fasteners securing the Processor PCA in position, then lower the Processor PCA until it disconnects from the CRT base cable. Connect the CRT cable extender (P/N 02620-60125) between the Processor PCA and the CRT base cable. Power ON the terminal and fill a portion of the screen with a letter such as "H".

6. Use the alignment tool to adjust the width adjustment on the Processor PCA (fig 5-4) to expand or contract the display in the horizontal axis.

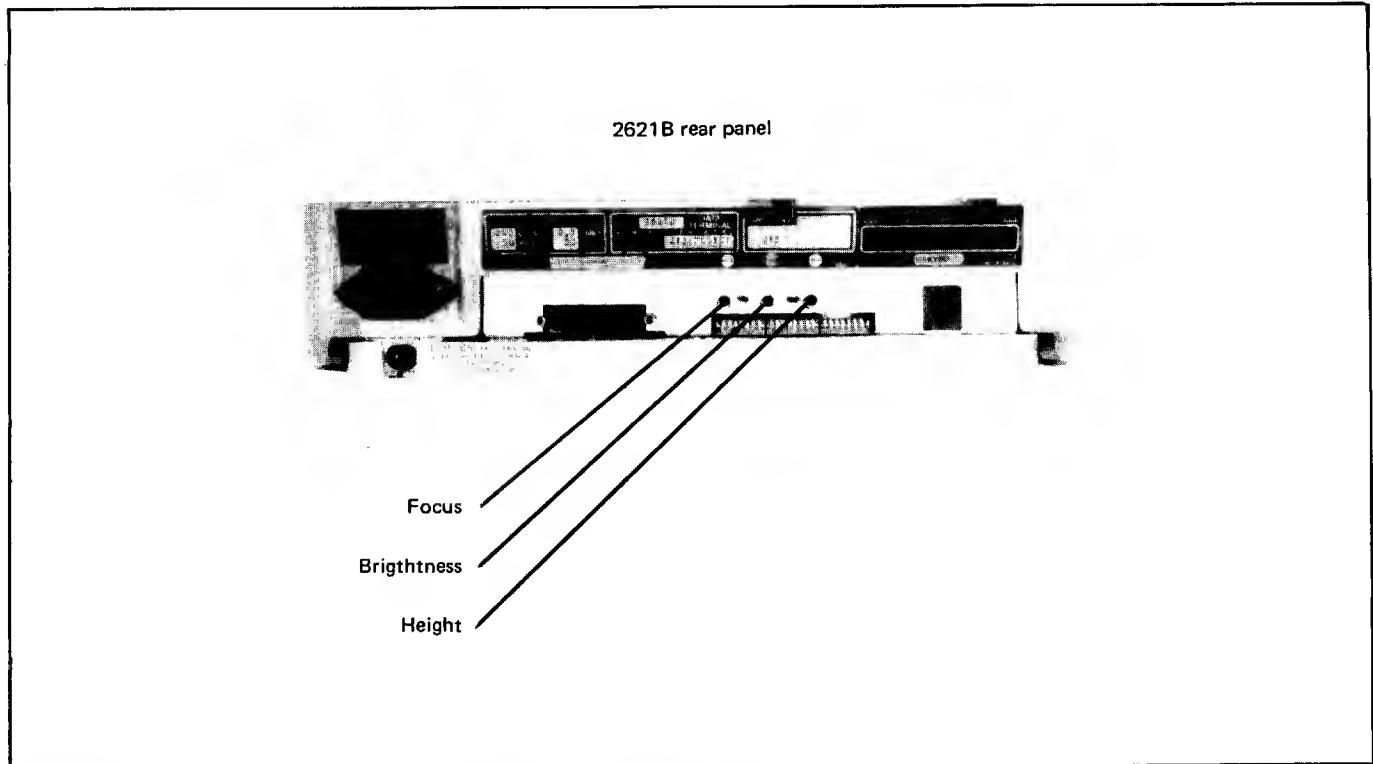


Figure 5-3 Location of Height, Focus And Brightness Adjustments

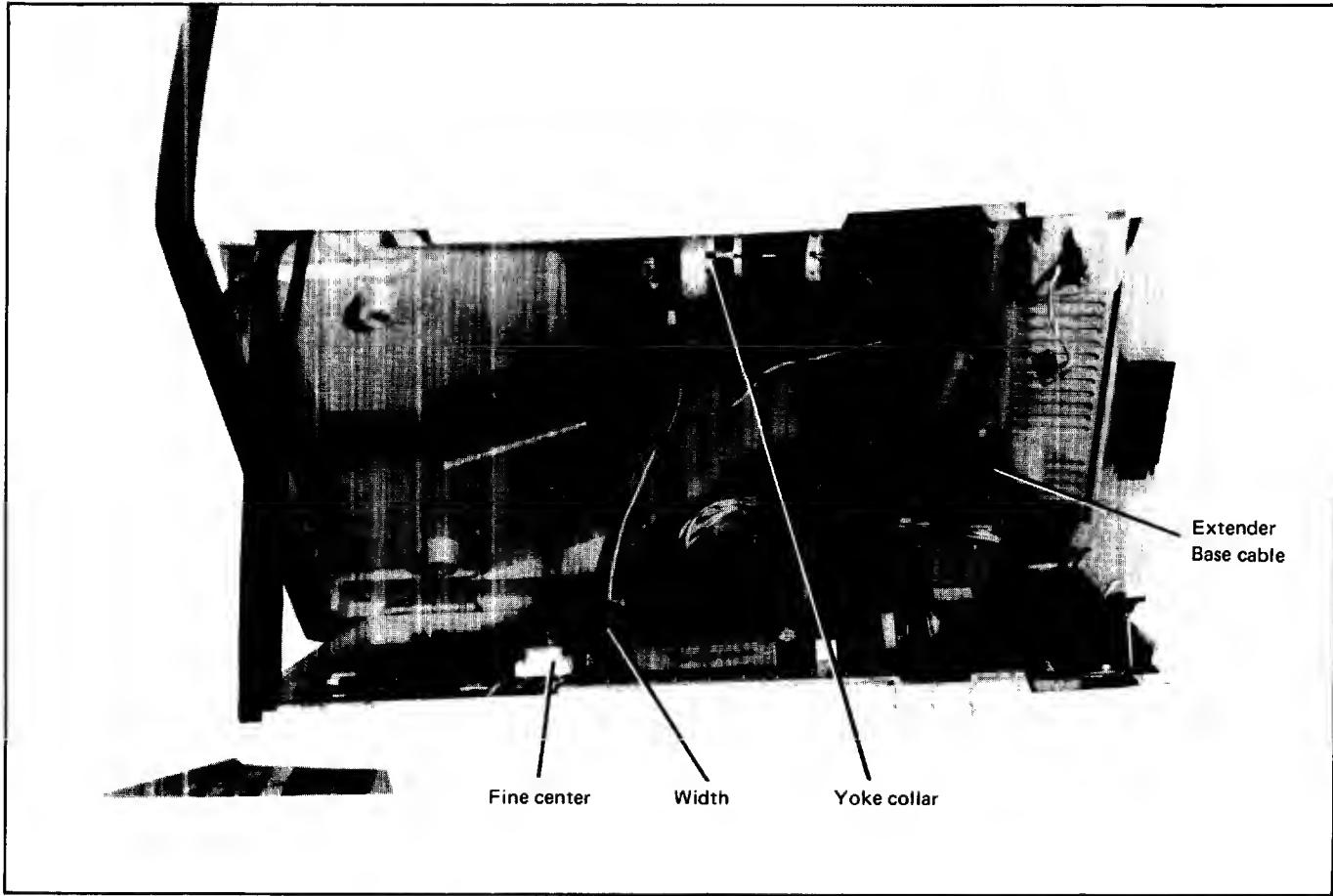


Figure 5-4 Location of Raster Width Ajudstment And Yoke Collar

7. When needed, the rough centering of the display may be adjusted, by rotating the two centering magnets on the Yoke collar (Fig 5-4) ; once this adjustment is correct, a fine adjustment of the display in the horizontal plane can be performed, using the rotary switch (figure 5-5).
8. While observing the display, adjust the dot stretch adjustment (figure 5-5) on the Processor PCA to produce either uniform width of the vertical and horizontal lines which form a character or the most desirable overall display effect.

**WARNING**

Use care in performing the following step; high voltages, sufficient to cause serious injury are present on exposed portions of the yoke assembly. Grasp the yoke only by its plastic doughnut-shaped body.

9. To adjust a tilted display; first loosen the yoke screw collar (see figure 5-4). The yoke assembly on the CRT neck must then be rotated using its plastic doughnut-shaped body. After making the adjustment retighten the yoke collar screw.

10. Switch the terminal off, disconnect the CRT cable extender from the Processor PCA, then from the CRT base cable; reconnect the Processor PCA to the CRT base cable.
11. Replace the Processor PCA by holding it in position (the metal I/O panel on one end of the PCA fits into the slots in the chassis). Install each of the two snap-in grommets into their respective fastening hole and press on each of the two snap-in plungers until they click into place.
12. Reconnect the ground strap to the ground lug on the Processor PCA.

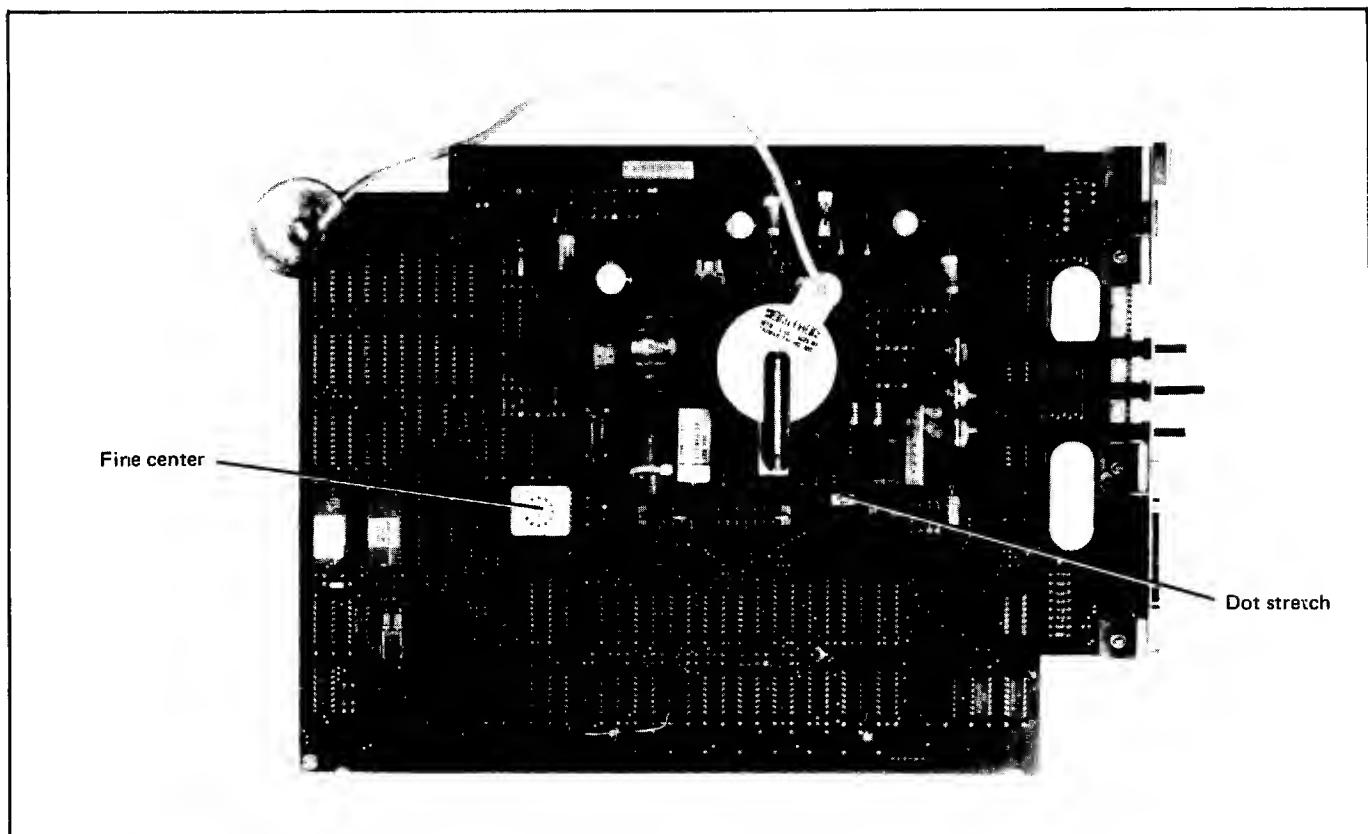


Figure 5-5 Dot Stretch And Fine Center Adjustment

**TROUBLESHOOTING****SECTION 6****INTRODUCTION**

This section provides troubleshooting information for locating terminal malfunctions in a replaceable assembly or component.

**WARNING**

The power supply and CRT contain exposed high-voltage components.

**PRELIMINARY TROUBLESHOOTING****WHY**

To determine if the terminal malfunction truly exists before attempting any detailed trouble isolation procedures, since the malfunction may be caused by incorrect operation.

**HOW**

Checking terminal installation and any recent servicing adjustments.

**WHEN**

Preliminary troubleshooting should be performed whenever the terminal is not operating correctly.

**PROCEDURE**

1. Check that the terminal is properly installed (power cord connected and fuse properly installed) and is set to the correct operating mode. Refer to INSTALLATION section for installation procedures.
2. Determine whether or not any recent service routines (accessory installation, cables removed or installed, power supply or raster adjustments performed) have been performed on the terminal. If so, check for workmanship. Refer to the Alignment Section for alignment procedures.

3. Check that strapping is properly configured for the terminal. Refer to strapping Section for configuring terminal strapping.

## MAIN TROUBLESHOOTING

---

### WHY

To minimize terminal down-time and to ensure optimum terminal performance.

### HOW

Using the terminal self-test to identify the malfunction and to isolate the malfunction to a replaceable assembly or component. There are five self-tests associated with the terminal:

1. Unit self-test. This test checks the overall performance of the terminal once.
2. Continuous Unit Self-Test. This test checks the overall performance of the terminal continuously.
3. Data Comm Self-Test. This test checks the functioning of the terminal's data communication.
4. TPM Self-Test. This test checks the terminal's printer unit.
5. TPM Local Self-Test. This test checks the printer continuously to detect intermittent errors.

When the terminal is switched ON, the unit self-test is performed. There is no message displayed unless an error is detected. A normal display is a blinking cursor (inverse video space or underline) at the top left of the screen and a set of primary labels at the bottom of the screen. If an error is detected, an error message is displayed at the bottom of the screen.

### WHEN

Whenever the terminal is not operating properly after preliminary troubleshooting.

### PROCEDURE

UNIT SELF-TEST. Unit self-test checks the display RAMS, program RAMS and program ROMS. Perform the test as follows:

1. At the keyboard, hold down [SHIFT], and press the TEST function ([Home Down]). In approximately five seconds, a test pattern or an error message will be displayed on the screen.
2. If the test pattern is good, a self-test pattern and primary terminal status is displayed on the screen (figure 6-1 or 6-2). Refer to the STRAPPING section for terminal status interpretation.
3. If an error is detected, an error message is displayed at the bottom of the screen. Table 6-1 gives the meaning of the error and what action to take to remedy the error.
4. After replacing the defective assembly or component, repeat the test. Repeat this step until the terminal displays a good test pattern.

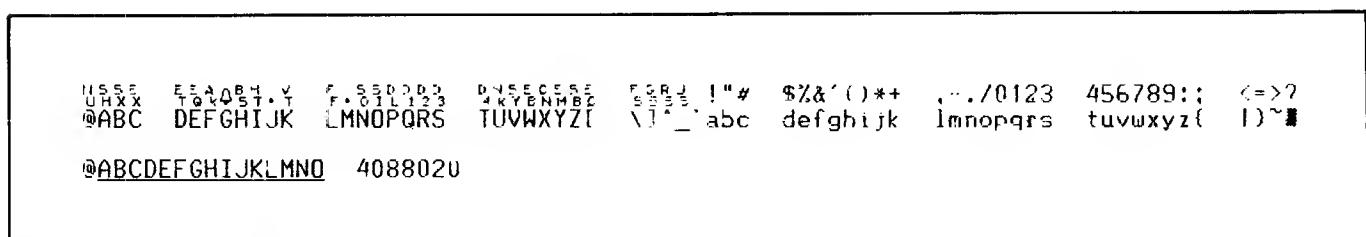


Figure 6-1 2621B Test Pattern

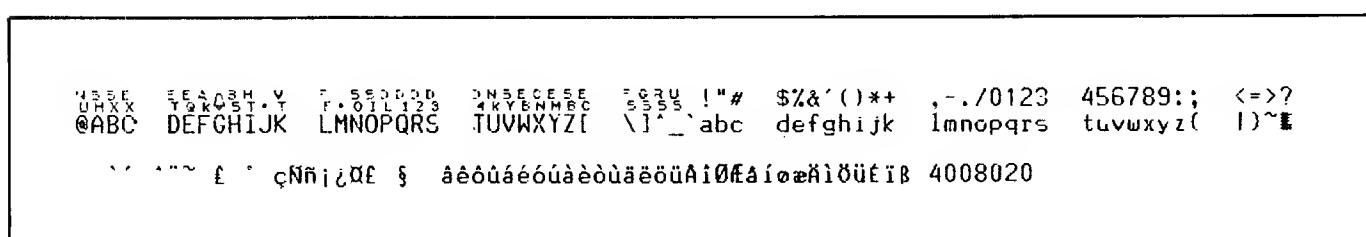


Figure 6-2 2621B Option 001-006 Or 010 Test Pattern

**CONTINUOUS UNIT SELF-TEST.** This test should be performed if an intermittent fault is suspected. Perform continuous unit self-test as follows:

1. Power OFF the terminal.
2. Set configuration switches II-1, 2 and 3 to the UP position (1)
3. POWER ON the terminal. The continuous self-test is automatically started.
4. A test pattern or error message is displayed continuously on the screen. On the 2621B option 050 the printer copies the test pattern approximately every 15 minutes.
5. Allow the test to continue until the error is determined.

Exit test by switching off the terminal and returning switches II-1,2 and 3 to their original position. Then POWER ON the terminal again.

DATA COMM SELF-TEST.The data comm self-test requires a test hood to loop the signals. 128 characters are transmitted and received at the selected baud rate, then the CC (Data Set Ready) signal is checked. Perform data comm self-test as follows:

1. Connect a Data Comm Self-Test Assembly (test hood, part no 02620-60062) or a modem with loop-back capability to the DATA COMM connector at the rear of the terminal.
  2. Press [CTRL], [SHIFT], and TEST function [Home Down] The cursor being continuously displayed indicates test execution.
  3. If an error is detected, a data comm error message is displayed on the screen. If no error is detected, no message is displayed on the screen, and the cursor resumes blinking. If a data comm error message is displayed, exit data comm test by pressing [RETURN] for at least 2 seconds.

**TPM SELF-TEST.** The thermal print mechanism (TPM) test is performed on the 2621B option 050 as follows:

1. Press [SHIFT], then the PRINTER function [Cursor Up]
  2. Press [SHIFT], then the PRT TEST function [Home Down]
  3. A test pattern (figure 6-3 or 6-4) is printed on paper or an error message may be displayed on the screen. Table 6-1 gives the meaning of the error message and what action to take.
  - 4) Obtain print-out by advancing the paper. This is done by pressing [SHIFT], and then the PAPER function [Curor Up]

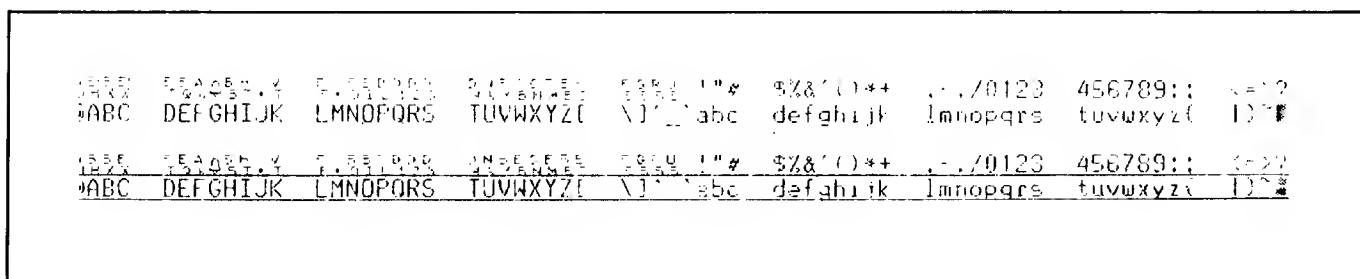


Figure 6-3 2621B Printer Self Test

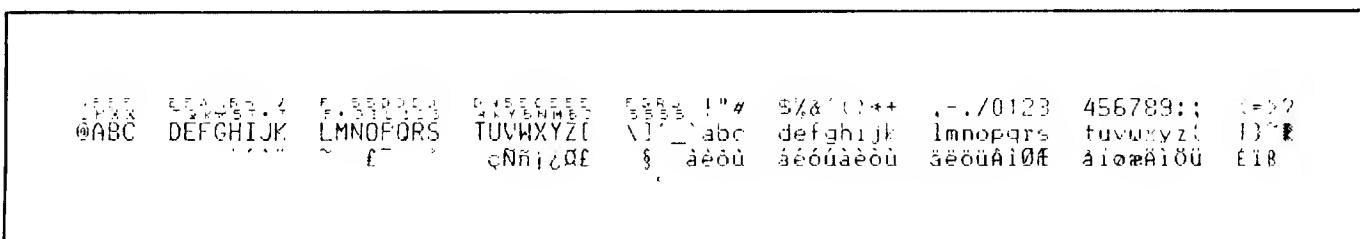


Figure 6-4 2621B Option 001-006 or 010 Printer Self Test

**TPM LOCAL SELF-TEST.** This test is used on the 2621B option 050 to detect intermittent printer errors. Perform this test only after executing the TPM Self-Test described in the previous paragraph. Proceed as follows:

1. Turn off terminal power.
2. Remove TPM top cover.
3. Locate the TPM PCA test connector J1 in the upper left-hand corner (as viewed from the front). Using a jumper wire, connect pins J1-1 (GND) and J1-2 (TEST) together.
4. Turn on terminal power.
5. Allow the test to continue until the printer error is firmly established by checking the print-out (check with figure 6-5 or 6-6 for the missing or faulty characters).
6. Refer to table 6-1 and replace the defective component or assembly.

```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ\n]`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|
```

Figure 6-5 TPM Local Self-Test Pattern - TPM PCA equipped with 1818-0763 character ROM

```
CDEFGHIJKLNMNOPQRSTUVWXYZ\n]`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
CDEFGHIJKLNMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
CDEFGHIJKLNMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
CDEFGHIJKLNMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|  
CDEFGHIJKLNMNOPQRSTUVWXYZ\n]^`~`abcde...ghi;jklmnopqrstuvwxyz{|\~`NS5EEFAQ3HLYZFCB|
```

Figure 6-6 TPM Local Self-Test Pattern - TPM PCA equipped with 1818-0981 character ROM

Table 6-1 Error Messages

Test Type	Error Msg	Meaning	Action
Unit Self-Test or Continuous Unit Self-Test	RAM ?  ROM ?	Replace Processor PCA  1. Replace Program ROM U112 (See fig.7-28) 2. Replace Program ROM U110 (See fig.7-28) 3. Replace Processor PCA	
Data Comm Self-Test	Data Comm ?	Data Set Ready (CC) did not go true OR Char recei- ved not same as char sent OR Char not received within approx. 2.5 seconds	1. No Self Test Hood  2. Replace Processor PCA

Continued ...

Table 6-1 Error Messages (Continued)

TPM Self-Test	Printer ?	Printer not ready. Lost or hung handshake	1. Add paper if needed Close door latch 2. Replace TPM PCA/Processor chip 3. Replace Program ROM U110 (see Fig.7-28) 4. Replace Processor PCA 5. Check printer cables
TPM Local Self-Test	None	Detects intermittent printer errors. Unable to perform TPM local self-test.	1. Check printer cables  2. Check 16.1V power supply (see table 5-1)  3. Replace TPM PCA/Removeable components
NOTES: 1. Items with more than one action, perform item 1, item 2, and so on 2. Refer to Parts Lists/Repair Section for parts location and parts numbers			

## USING THE HEAD LOAD ASSEMBLY

## PURPOSE

The Head Load Assembly (part no 02670-60029) is used in place of the TPM print head to help determine if the TPM PCA is defective. The Head Load Assembly checks the status of the print mechanism's dot matrix scheme.

## CAUTION

- A defective TPM PCA may cause a print head replacement to become defective. Before replacing the print head, use the Head Load Assembly to determine if the TPM PCA is defective.

## PROCEDURE

To use the Head Load Assembly, the print head cable must be removed and the Head Load Assembly installed in its place. Install the Head Load Assembly in the TPM as follows:

- 1) Turn off terminal power and remove the top cover.
- 2) Raise door latch and remove the paper roll.
- 3) Carefully disconnect the flex end of the print head cable from the TPM PCA connector.
- 4) With component side up, plug the long connector side of the Head Load Assembly (figure 6-7) into TPM PCA connector (slot in TPM mainframe). Ensure that the Head Load Assembly is seated fully into TPM mainframe.
- 5) Place a small piece of paper over the paper detector (photodetector) located inside TPM mainframe at right side.
- 6) Lower and close door latch.
- 7) Locate TPM PCA test connector J1 in the upper left-hand corner (as viewed from the front). Using a jumper wire, connect pins J1-1 (GND) and J1-2 (TEST) together.
- 8) Turn on terminal power and allow this test (TPM local self-test) to run several times.
- 9) Observe operation of LEDs on Head Load Assembly. If the LEDs stay on or off continuously during the test, then TPM PCA may be defective. Normal operation is random blinking of LED's 2 through 14 while the print head travels from left to right, and all LED's are off as the print head retraces (linefeed and carriage return). LED's 1 and 15 may flicker slightly but have no effect in determining PCA status.

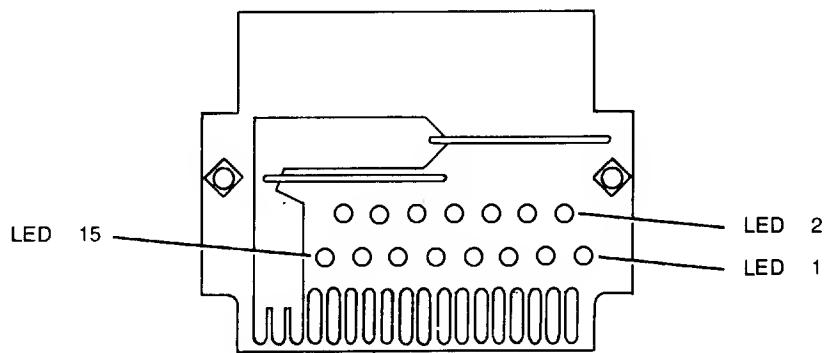


Figure 6-7 Head Load Assembly

## PARTS LIST/REPAIR

## SECTION 7

INTRODUCTION

This section provides instructions for removing and replacing terminal assemblies and components designated as field replaceable. Also included is a listing of field replacement parts, procedures for ordering replaceable parts, and a listing of exchange modules.

REMOVAL AND REPLACEMENT PROCEDURES

The terminal's modular design allows the removal and replacement of the various field replaceable parts. The following paragraphs describe removal and replacement procedures for the terminal. Differences in the 2621B option 050 will be noted in each procedure.

**WARNING**

Hazardous voltages are present inside the terminal. Always remove AC power when working inside the terminal. Removal and replacement procedures contained in this section must only be performed by qualified service personnel.

**TOP COVER**

**REMOVAL.** Set terminal power to the off position, disconnect the power cord, and proceed as follows:

1. Using a small Phillips-head screwdriver, loosen the two quarter-turn fasteners, securing the top cover to mainframe. Do not turn the fasteners more than a quarter-turn.
2. Slide the top cover toward the rear slightly and remove.

**REPLACEMENT.** Replace the top cover as follows:

1. Position top cover to the mainframe and slide it forward into the groove of the bezel.
2. Secure top cover to mainframe by tightening the two quarter-turn fasteners. Do not overtighten the fasteners.

**MAINFRAME**

**REMOVAL.** Set terminal power to the off position, disconnect the power cord and keyboard cable assembly, disconnect the data comm cable assembly (if present), and proceed as follows:

1. For 2621B option 050 remove the top cover to disconnect the fan cable assembly from Power Supply PCA connector J1.
2. Loosen the quarter-turn fastener at the left rear of the terminal (as viewed from the rear). See figure 7-1.
3. Hold the pedestal in place and slide mainframe forward about 6 mm (1/4 inch).

**CAUTION**

Use extreme care when placing the terminal in the half-open (service) position. Failure to do so may cause terminal to tip over causing personal injury or damage to the terminal.

4. Grasp the left side of mainframe and lift it upward until the top prop locks the mainframe in the half-open (service) position.
5. For 2621B option 050 (refer to "PROCESSOR PCA"), lower the Processor PCA onto the support. Pull fan cable assembly through the opening in mainframe. Then re-attach the Processor PCA to mainframe.
6. Squeeze the upper end of the top prop and lift the mainframe upward (see figure 7-2). Then slide the mainframe forward until it is free from the support hinge and remove it.

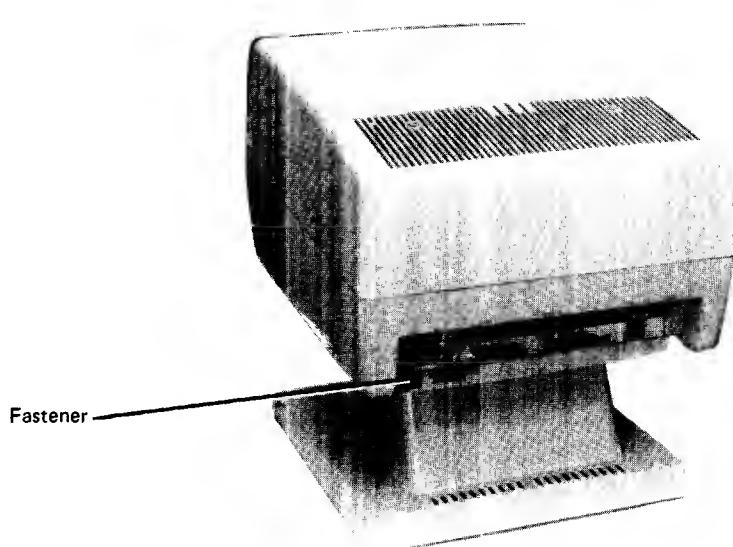


Figure 7-1 2621B Terminal (Rear View)

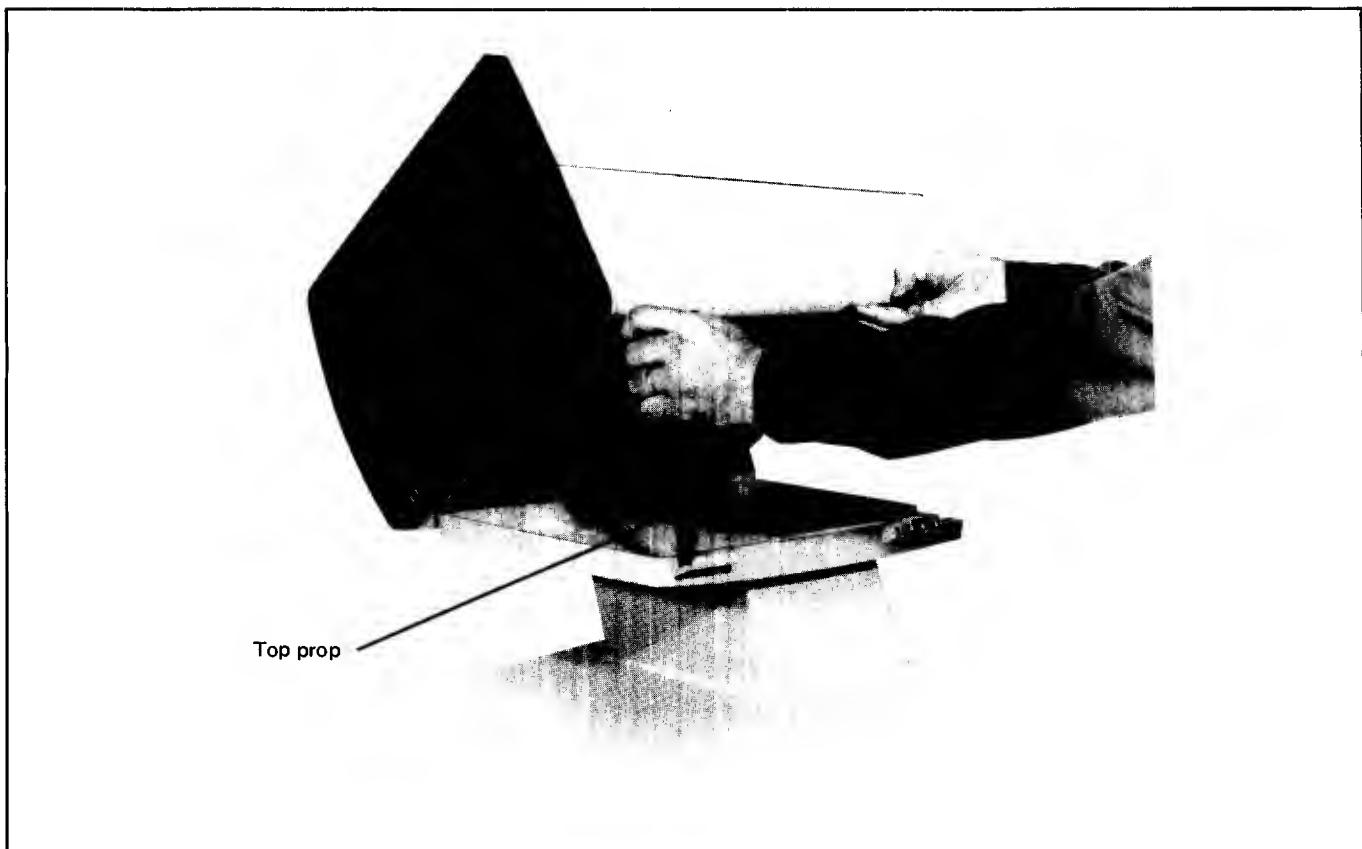


Figure 7-2 Terminal Set To The Half-Open Position

**REPLACEMENT.** Replace mainframe as follows:

1. Position mainframe onto support hinge. Slide mainframe and support together until they are hinged.
2. For 2621B option 050, lower Processor PCA onto support. Route the fan cable assembly through opening in mainframe and connect it to Power Supply PCA connector J1. Re-attach Processor PCA to mainframe and reconnect ground strap.
3. Lower the mainframe onto top prop.
4. For 2621B option 050 make sure that the fan cable is resting in the support slots and cable clip.
5. Squeeze upper end of the top prop and lower the mainframe to its closed position.
6. Slide mainframe toward the rear and secure in place by tightening the quarter-turn fastener at left rear of terminal. Do not overtighten the fastener.
7. For 2621B option 050, reconnect the fan cable to Power Supply PCA connector J1.

8. Replace top cover. Reconnect power cord, keyboard cable assembly, and data comm cable assembly (if required).

#### SUPPORT

REMOVAL. Set terminal power to the off position, disconnect the power cord, disconnect keyboard cable assembly and data comm cable assembly (if present), remove mainframe, and proceed as follows:

1. Remove the four screws and washers securing support to pedestal (figure 7-3)
2. Remove support from pedestal.
3. For 2621B option 050, pull fan cable assembly through opening in support.

REPLACEMENT. Replace support as follows:

1. Position support onto pedestal.
2. For 2621B option 050 route fan cable assembly through support opening, two slots, and cable clip.
3. Secure support in place with the four screws and washers.
4. Attach mainframe to support, then secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.
5. Reconnect keyboard cable assembly, the data comm cable assembly (if required), and power cord.

#### PEDESTAL

REMOVAL. Set terminal power to the off position, disconnect the power cord, disconnect the keyboard cable assembly and data comm cable assembly (if present), and proceed as follows:

1. Position mainframe to the half-open (service) position.
2. Remove mainframe from support.
3. Remove the four screws and washers securing support to pedestal. Remove pedestal.
4. For 2621B option 050 remove the two screws and washers securing fan assembly to pedestal (see Ventilating Fan).

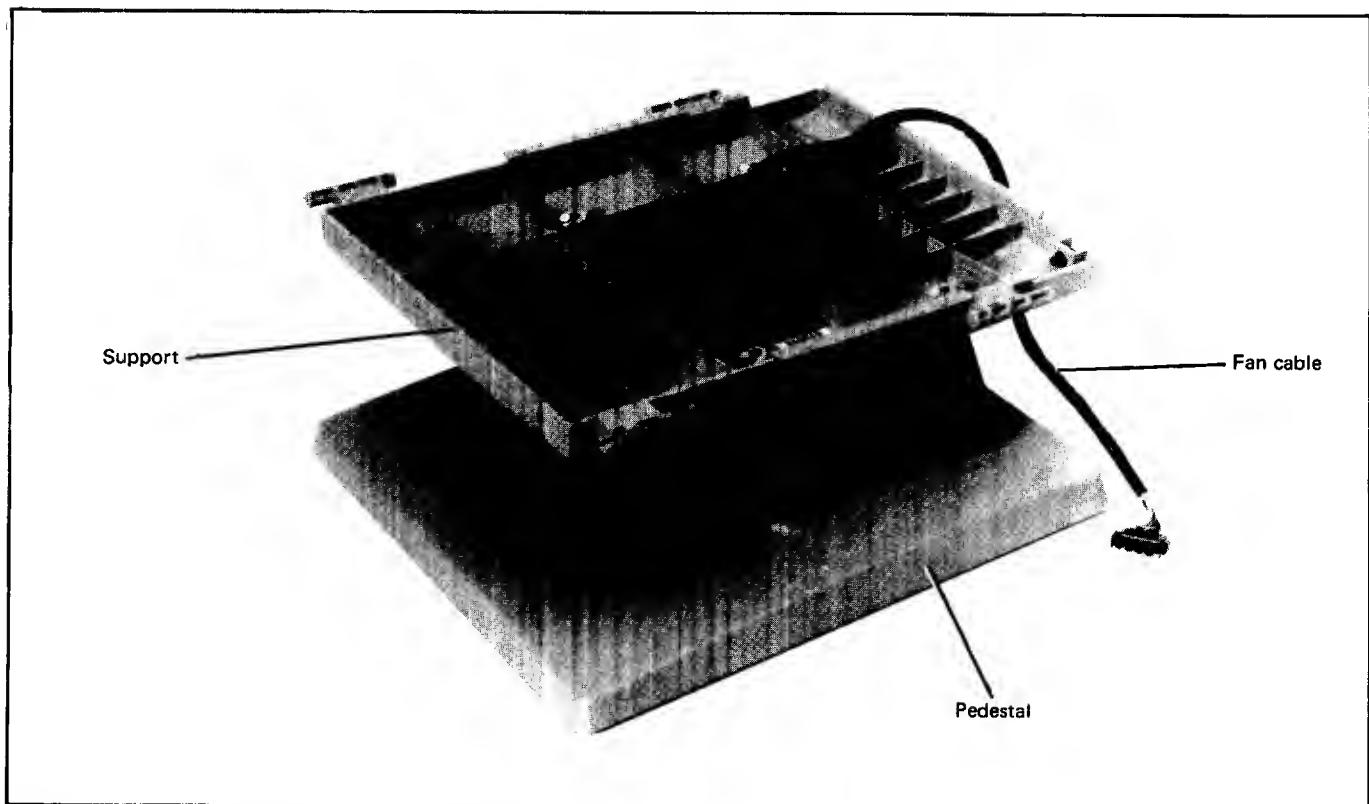


Figure 7-3 Support and Pedestal

**REPLACEMENT.** Replace pedestal as follows:

1. For 2621B option 050 reinstall fan assembly onto pedestal (refer to "VENTILATING FAN"). Route fan cable assembly through support opening, two slots, and cable clip.
2. Position support over pedestal and align the four holes.
3. Secure support to pedestal with the four screws and washers.
4. Position mainframe onto support and lower it onto the top prop.
5. For 2621B option 050 connect fan cable to Power Supply PCA connector J1.
6. Lower mainframe onto support, slide it rearward, and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.
7. Reconnect keyboard cable assembly, data comm cable assembly (if required), and power cord.

## VENTILATING FAN

Only the 2621B option 050 uses a ventilating fan for cooling. Procedures for removing and replacing the fan follow.

**REMOVAL.** Set terminal power to the off position, disconnect the keyboard cable assembly and data comm cable assembly (if installed), disconnect the power cord, and proceed as follows:

1. Remove top cover and disconnect fan cable assembly from Power Supply PCA connector J1.
2. Remove mainframe from support (refer to "MAINFRAME").
3. Remove support from pedestal.
4. Remove the two screws and washers securing fan to pedestal cavity (figure 7-4) and remove the fan.

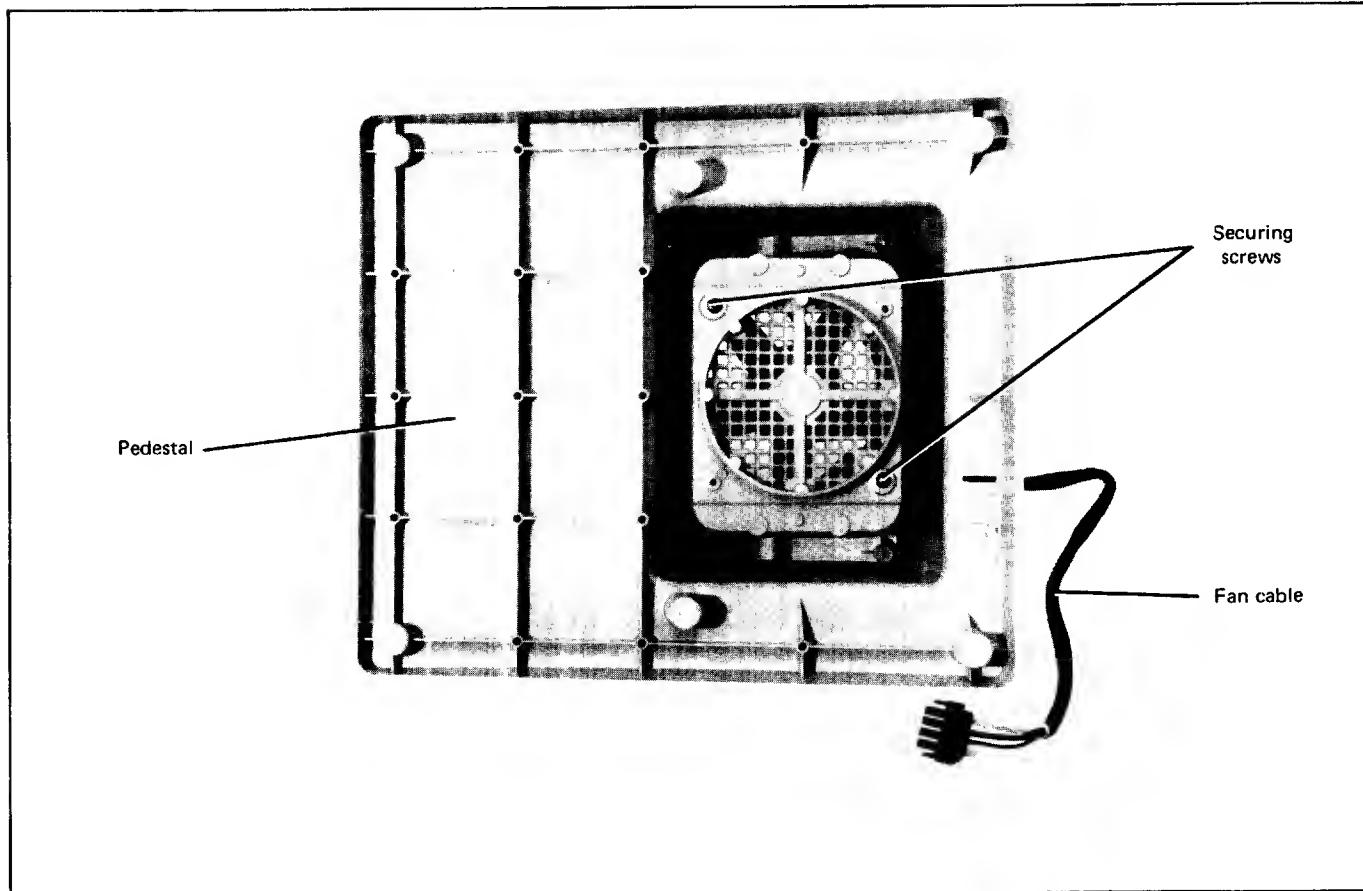


Figure 7-4 Fan Removal (2621B Option 050)

REPLACEMENT. Replace the ventilating fan as follows:

1. Position the fan in the pedestal cavity with the air flow direction of the fan facing upwards and tighten the two screws securing the fan to the pedestal cavity.
2. Route the fan cable assembly through support opening, the two slots, and the cable clip.
3. Reinstall the support on pedestal and secure in place with the four screws and washers.
4. Reinstall mainframe on the support hinges in the half-open (service) position.
5. Lower the Processor PCA and route the fan cable through mainframe opening. Connect fan cable to Power Supply PCA connector J1.
6. Reinstall Processor PCA and reconnect ground strap to Processor PCA ground lug.
7. Close mainframe and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.
8. Replace top cover, reconnect the keyboard cable assembly, data comm cable assembly (if required) and the power cord.

#### PRINTED CIRCUIT ASSEMBLIES

Printed circuit assemblies (PCA's) are easily removed and replaced. The following paragraphs provide removal and replacement procedures for each PCA installed in the terminal.

##### Processor PCA

REMOVAL. Set the terminal power switch to OFF, disconnect the power cord, keyboard cable assembly, and data comm cable assembly (if present). Set mainframe to the half-open position, and proceed as follows:

1. Disconnect the ground strap from Processor PCA ground lug at terminal left rear.
2. Pull outwards on each of the two snap fasteners securing Processor PCA to mainframe bottom. Lower Processor PCA until it rests on the support (figure 7-5 and 7-6). (It will then be disconnected from the CRT base cable).

**CAUTION**

High voltage are present within the Processor PCA, in the SWEEP area. Use caution when working in this area.

3. Disconnect the two cable assemblies from their respective connectors (J2 and J3).
4. For 2621B option 050 disconnect the thermal print cable assembly from connector J4.
5. Use caution and carefully disconnect the high voltage cable assembly from the CRT high voltage connector by squeezing the insulated connector.
6. Carefully remove the Processor PCA.

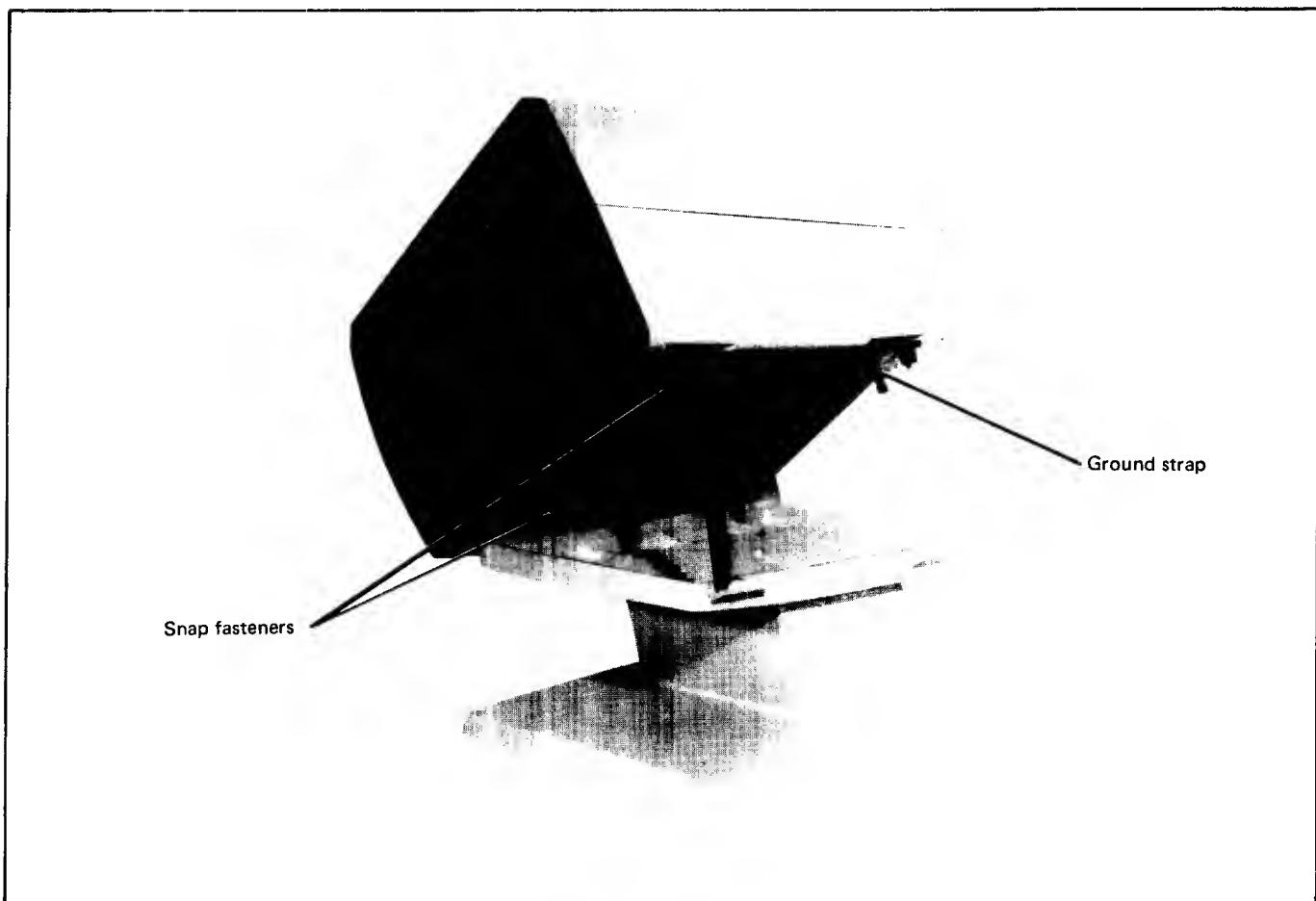


Figure 7-5 Releasing The Processor PCA

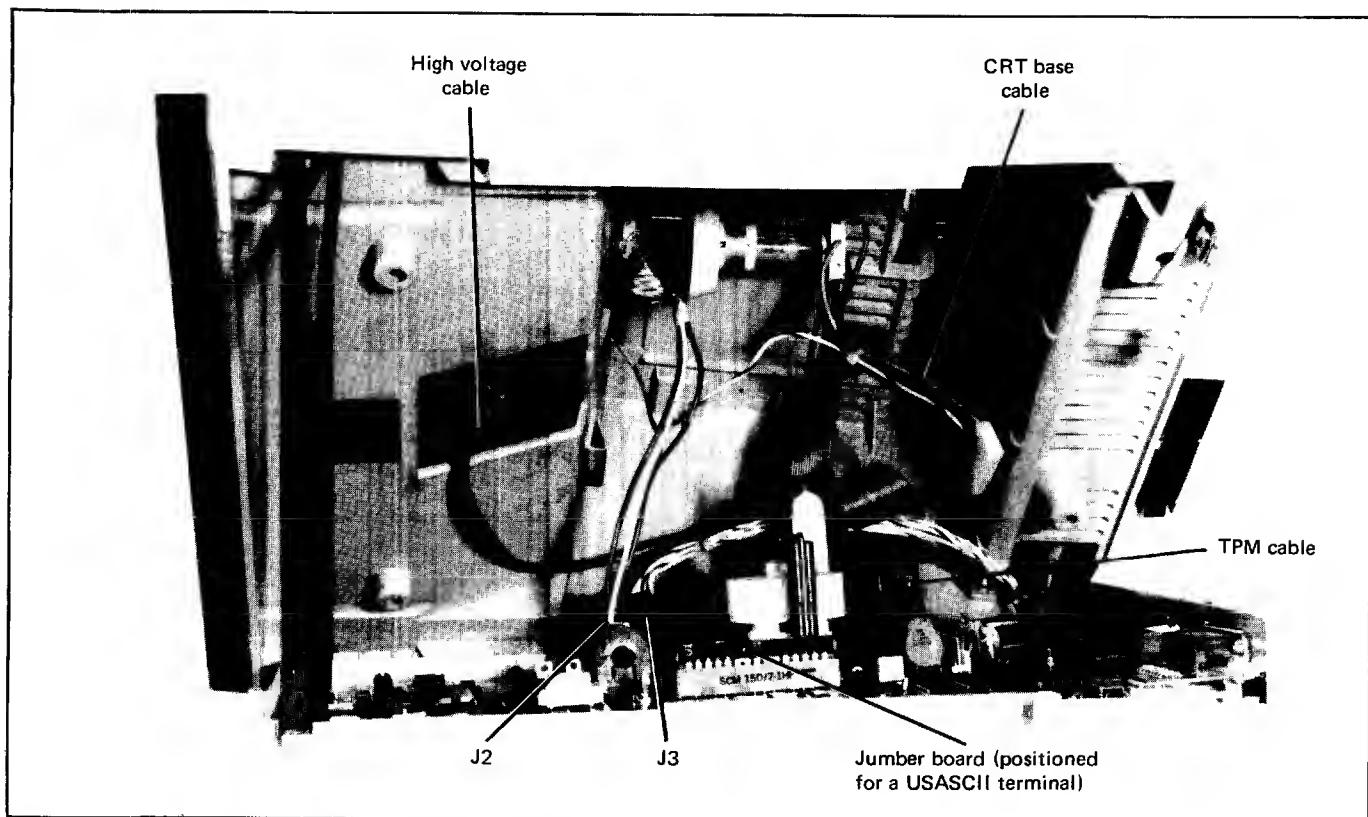


Figure 7-6 Processor PCA Removal

**REPLACEMENT.** Replace Processor PCA as follows:

Ensure that the Jumper Board is correctly positioned in its connector (an "S" appears if the terminal is USASCII, an "E" if the terminal has a national option).

1. If replacement PCA requires ROM's, transfer them from the previously removed PCA. Use an IC removal tool (part no 8710-0585) to carefully withdraw the ROM's from their IC sockets (see figure 7-10).

**CAUTION**

Integrated circuits can be damaged by electrostatic discharge. Use the following precautions:

- \* DO NOT wear clothing subject to static charge buildup, such as wool or synthetic materials.
- \* DO NOT handle integrated circuits in carpeted areas.
- \* DO NOT remove IC from its conductive foam pad until you are ready to install it.
- \* AVOID touching circuit leads. Handle by the plastic package only.

- \* ENSURE that IC, work surface (table, desk, etc) and PCA are all at the same ground potential. This can be done by touching the foam pad to the PCA and then touch the foam pad, circuit, and PCA to the work surface.
- 2. Connect the two cable assemblies (Yoke cable and Logic Power cable) to their respective connectors (J2 and J3). For 2621B option 050 connect the thermal print cable assembly to connector J4 (the red stripe on the edge of the flat cable should be on the right side) Reconnect the high voltage cable to the CRT connector (hole in CRT).
- 3. Lift the Processor PCA and reconnect the CRT base cable to the Processor PCA.
- 4. Position the Processor PCA onto the mainframe bottom and insert the lugs into the mainframe slots. Install each of the two snap-in grommets into their respective fastening holes and then push inwardly on each of the two snap-in plungers until they click in place.
- 5. Reconnect the ground strap to the Processor PCA ground lug.
- 6. Lower the mainframe onto the support and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.
- 7. Reconnect keyboard cable assembly, data comm cable assembly (if required), and power cord.

#### Power Supply PCA

---

REMOVAL. Set terminal power to the off position, disconnect the power cord, remove the top cover, and proceed as follows:

- 1. Disconnect the five cable assemblies from their respective connectors: J1, J2 or J3, and J4 thru J6. For 2621B option 050, the connectors are J1 thru J3, J5 and J6.
- 2. At top of the Power Supply PCA, pull outwardly on each of the three snap fasteners securing PCA to mainframe (see figure 7-7).

Note: For 2621B option 050 there are four snap fasteners securing the Power Supply PCA to mainframe (see figure 7-8).

- 3. Remove Power Supply PCA by pulling it upward from the mainframe cavity.

REPLACEMENT. Replace Power Supply PCA as follows:

- 1. Slide Power Supply PCA into mainframe cavity and secure in place by pushing inwardly on each of three snap-in grommets and then the three snap-in plungers. For 2621B option 050, there are four snap fasteners.

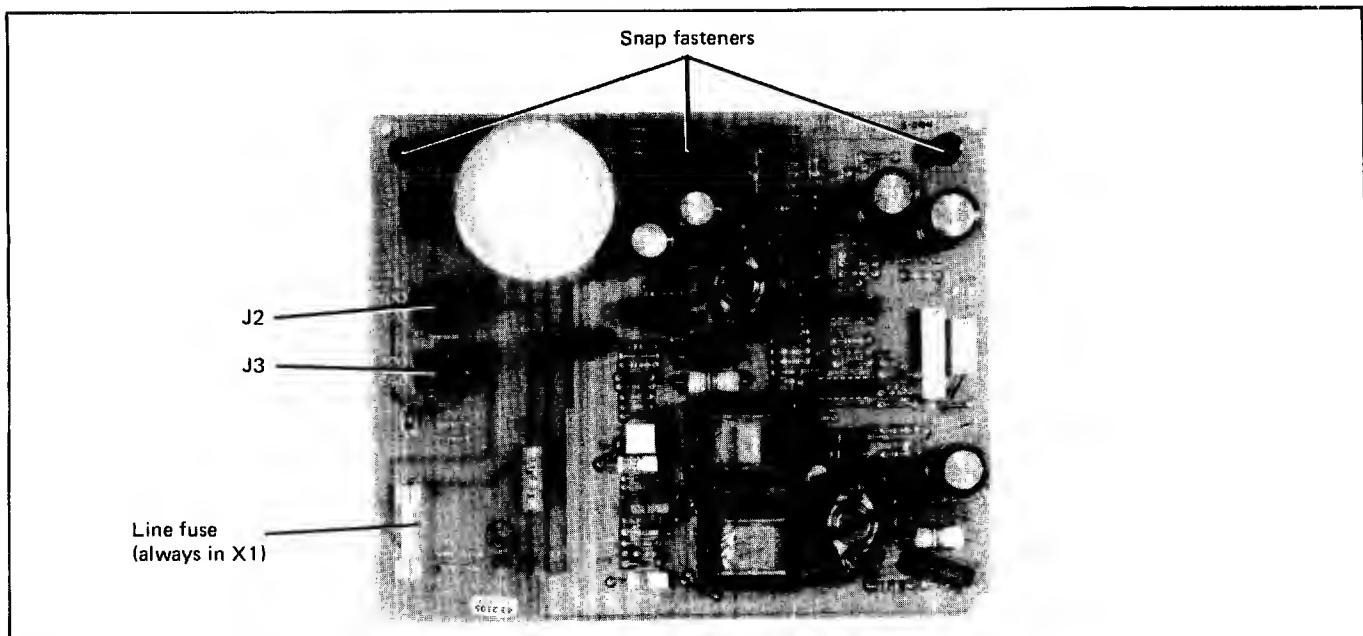


Figure 7-7 2621B Power Supply

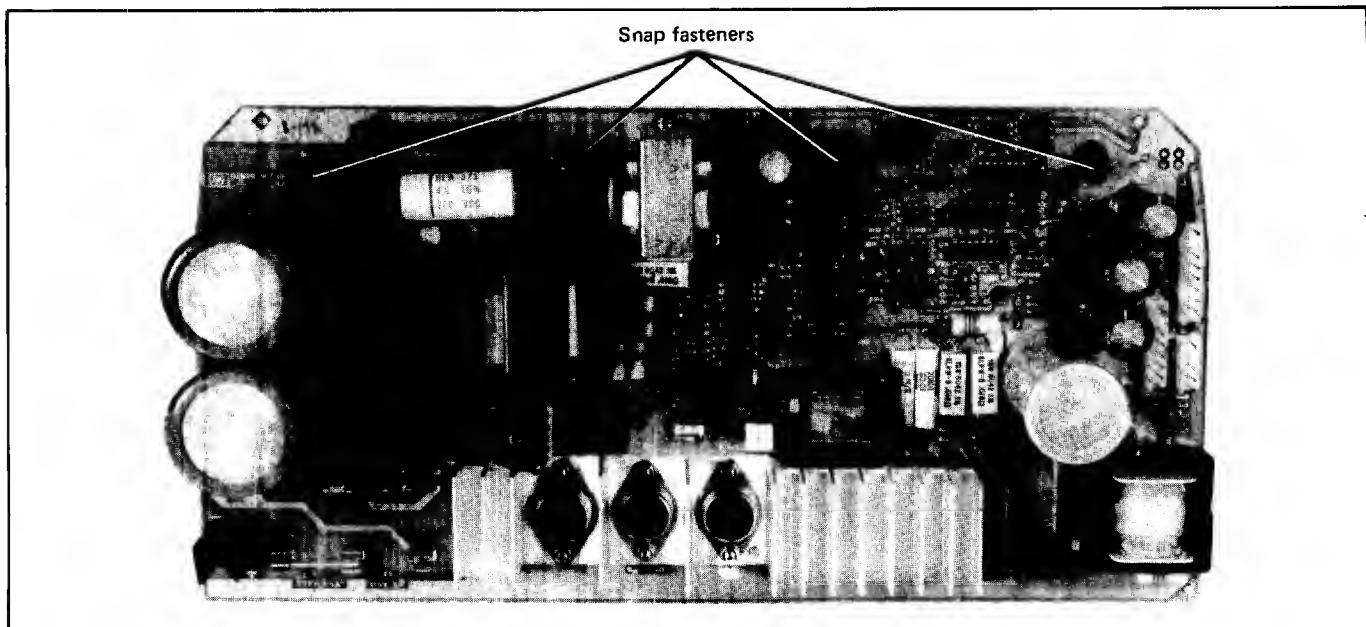


Figure 7-8 2621B Option 050 Power Supply

2. Reconnect the five cable assemblies to their respective connectors J1, J2 or J3, and J4 through J6. For 2621B option 050 these connectors are J1 through J3, J5 and J6.

Note: For the 2621B, connector J2 is for 100-120V and connector J3 is for 220-240V.

3. Check that the line fuse is correct for the configured line voltage. Refer to "Installing the Terminal" in Section II for a description of the fuse position.

4. Replace top cover and reconnect the power cord.

#### KEYBOARD ASSEMBLY

REMOVAL. Turn off terminal power, disconnect the keyboard cable by pressing underneath the keyboard connector, then remove keyboard assembly.

REPLACEMENT. Replace Keyboard Assembly as follows:

1. Connect keyboard cable to KYBD connector at terminal rear.
2. Reconnect the power cord.

#### KEYBOARD PCA

REMOVAL. Remove the Keyboard PCA as follows:

1. Turn off terminal power.
2. Disconnect the keyboard cable assembly.
3. Remove the four screws securing keyboard top to keyboard base (figure 7-20).
4. Remove keyboard top, disconnect keyboard cable from the Keyboard PCA, and then remove the Keyboard PCA from the keyboard base.

REPLACEMENT. Replace Keyboard PCA as follows:

1. Place Keyboard PCA over keyboard base separators.
2. Route the keyboard cable into the groove on the keyboard base. Reconnect keyboard cable to the keyboard PCA connector.
3. Place keyboard top over Keyboard PCA and secure in place with the four screws
4. Reconnect keyboard cable to KYBD connector at terminal rear.
5. Reconnect the power cord.

#### KEYCAPS

REMOVAL. Using the keycap disassembly tool (part no 8710-1179) carefully hook the keycap bottom edge and lift keycap from the Keyboard Assembly (see figure 7-9).

REPLACEMENT. Install new keycap over vacated switch on Keyboard Assembly as follows:

**CAUTION**

Switch contacts can be damaged if keycap is not installed at its designed angle. Use care when installing keycaps.

1. Position replacement keycap over vacated switch at its designed angle.
2. Push down on the keycap at its designed angle until the keycap is fully seated.

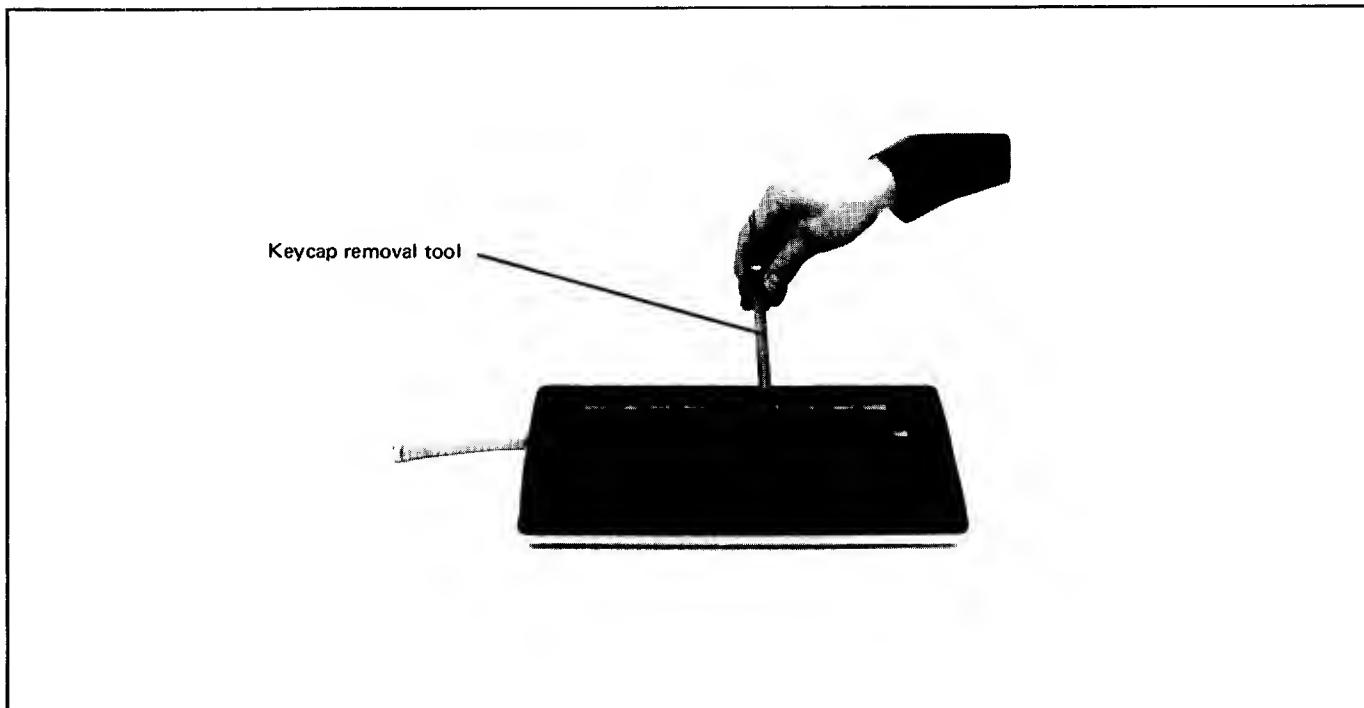


Figure 7-9 Keycap Removal

**INTEGRATED CIRCUIT**

**REMOVAL.** If a defective Read-Only-Memory (ROM) is to be replaced, set terminal power switch to the off position, disconnect the power cord, remove defective PCA, and proceed as follows:

**CAUTION**

Integrated circuits can be damaged by electrostatic discharge. Use the following precautions:

- \* DO NOT wear clothing subject to static charge buildup, such as wool or synthetic materials.

- \* DO NOT handle IC's in carpeted areas.
- \* DO NOT remove the IC from its conductive foam pad until you are ready to install it.
- \* AVOID touching the circuit leads. Handle by the plastic package only.
- \* ENSURE that the circuit, work surface (table, desk etc) and PCA are all at the same potential. This can be done by touching the foam pad to the PCA and then touch the foam pad, circuit, and PCA to the work surface. A portable static-safe work station is available, HP part no 9300-0794.

1. Locate the defective IC.
2. Using an IC removal tool (part no 8110-0585), remove defective IC from its socket.

**REPLACEMENT** When replacing a defective IC, be aware that each IC must be oriented and aligned in its socket, i.e. pin 1 of the IC matches pin 1 of the PCA. All IC's on a PCA are usually installed in the same direction, i.e. the notched ends of the IC's are facing in one direction for correct orientation. Pin 1 is usually indicated on the PCA by a mark and pin 1 on the IC is marked by a dot or notch. These markings help to ensure that both the IC socket and IC are installed correctly (see figure 7-10). Install new IC as follows:

1. Observe correct IC orientation and install replacement IC into IC socket.
2. Reinstall the PCA.

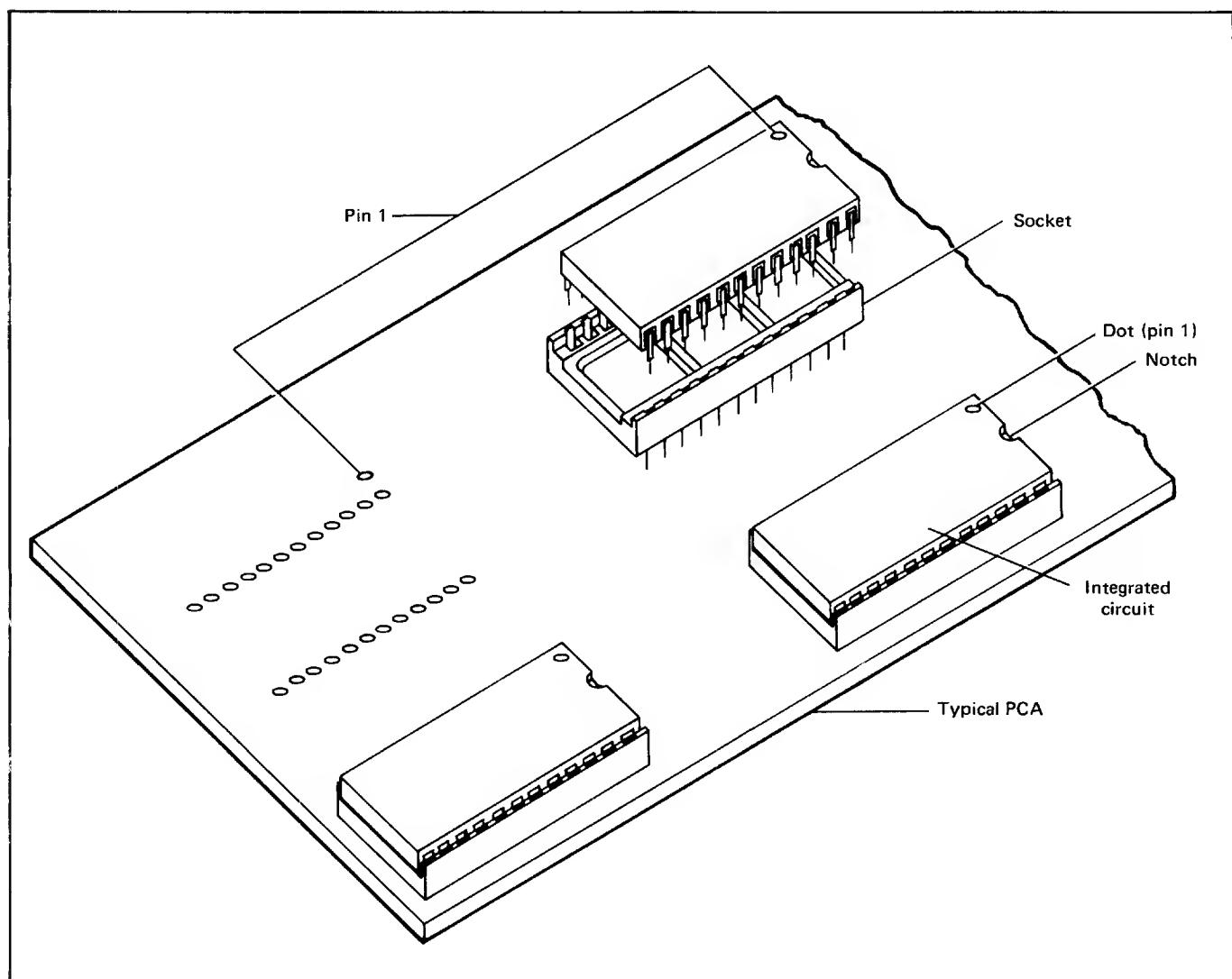


Figure 7-10 Installing An IC

#### THERMAL PRINT MECHANISM (TPM) ASSEMBLY

The thermal print mechanism (TPM) has been designed as a field replaceable assembly as well as the TPM PCA, and print head. The procedures for removing and replacing these assemblies are as follows:

**REMOVAL.** Switch off the terminal, disconnect the power cord, remove top cover, and proceed as follows:

1. Raise door latch and remove paper and paper roll rod from TPM.
2. Use an IC removal tool and unsnap the two snap fasteners securing TPM to mainframe (see figure 7-11)
3. Lift back of TPM mainframe and slide TPM forward slightly. Do not grasp TPM motors when handling TPM.

4. Disconnect the two cable assemblies from their respective connectors. Also disconnect the ground cable at the quick-disconnect point which separates cable 02670-60002 from cable 02670-60081. Then remove the TPM assembly.

5. Loosen the two screws securing magnetic shield to TPM. Slide magnetic shield outward for removal.

REPLACEMENT. Replace the TPM as follows:

1. Slide the just removed magnetic shield onto TPM replacement and secure in place with the two screws.
2. Reconnect the two cable assemblies to their respective connectors (J2 and J3; the red stripe on the edge of the flat cable should be on the right side when the TPM is viewed from the front), and position TPM onto mainframe. Also reconnect the ground cable.
3. Slide TPM forward to hook front hooks onto mainframe. Be sure that TPM is properly positioned at the front hooks and snap fastener holes in mainframe.
4. Raise door latch and secure TPM in place by pushing inward on the two snap-in grommets and then the two snap-in plungers.
5. Replace paper roll and lower door latch.
6. Replace top cover and reconnect the power cord.

#### TPM PCA

REMOVAL. Set terminal power to the off position, disconnect the power cord, remove top cover and TPM, and proceed as follows:

1. Remove the three screws securing TPM PCA to TPM mainframe.
2. Disconnect the remaining five cable assemblies from their respective connectors.
3. Disconnect PRINT HEAD from TPM PCA as explained in next paragraph.
4. Remove TPM PCA from TPM mainframe.

REPLACEMENT. Replace the TPM PCA as follows:

1. If replacement PCA requires ROMs, remove them from the just removed PCA. Reinstall these ROMs in their respective IC sockets. Refer to "INTEGRATED CIRCUIT" and see figure 7-29. Reconfigure TPM strapping (refer to Strapping Section).
2. Position TPM PCA onto TPM mainframe hooks and secure in place with the three screws.

3. Install the printer head (flex) cable into connector J4 (slot in TPM mainframe) as explained in the next paragraph.
4. Reconnect the remaining cable assemblies to their respective connectors.
5. Reinstall top cover and reconnect power cord.

#### PRINT HEAD

Two procedures are required to remove the print head. First the thermal print mechanism must be removed from the terminal. Second the print head assembly (which includes the print head) must be removed.

REMOVAL. To remove thermal print mechanism (TPM) from terminal proceed as follows:

1. Switch off the terminal, disconnect the power cord, and remove the top cover.
2. Raise door latch and remove paper and paper roll rod from TPM.
3. Use an IC removal tool and unsnap the two snap fasteners securing TPM to mainframe (see figure 7-11).
4. Lift back of TPM mainframe and slide TPM forward slightly. Do not grasp TPM motors when handling TPM.
5. Disconnect the two cable assemblies from their respective connectors (J2 and J3) and remove TPM.

To remove print head assembly from TPM proceed as follows:

1. Raise door latch.
2. Remove tear window (see figure 7-12).
3. Remove the removable rod.

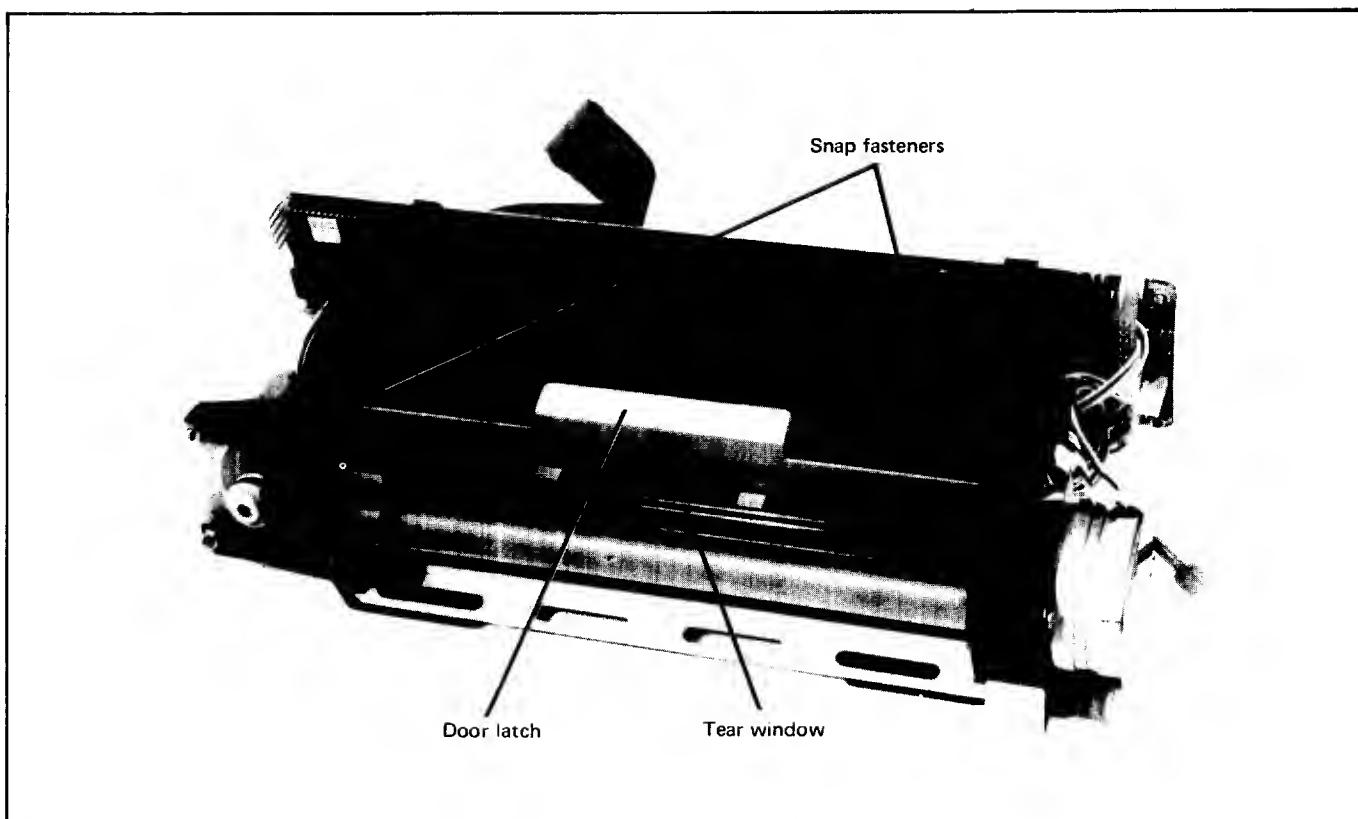


Figure 7-11 TPM Removal

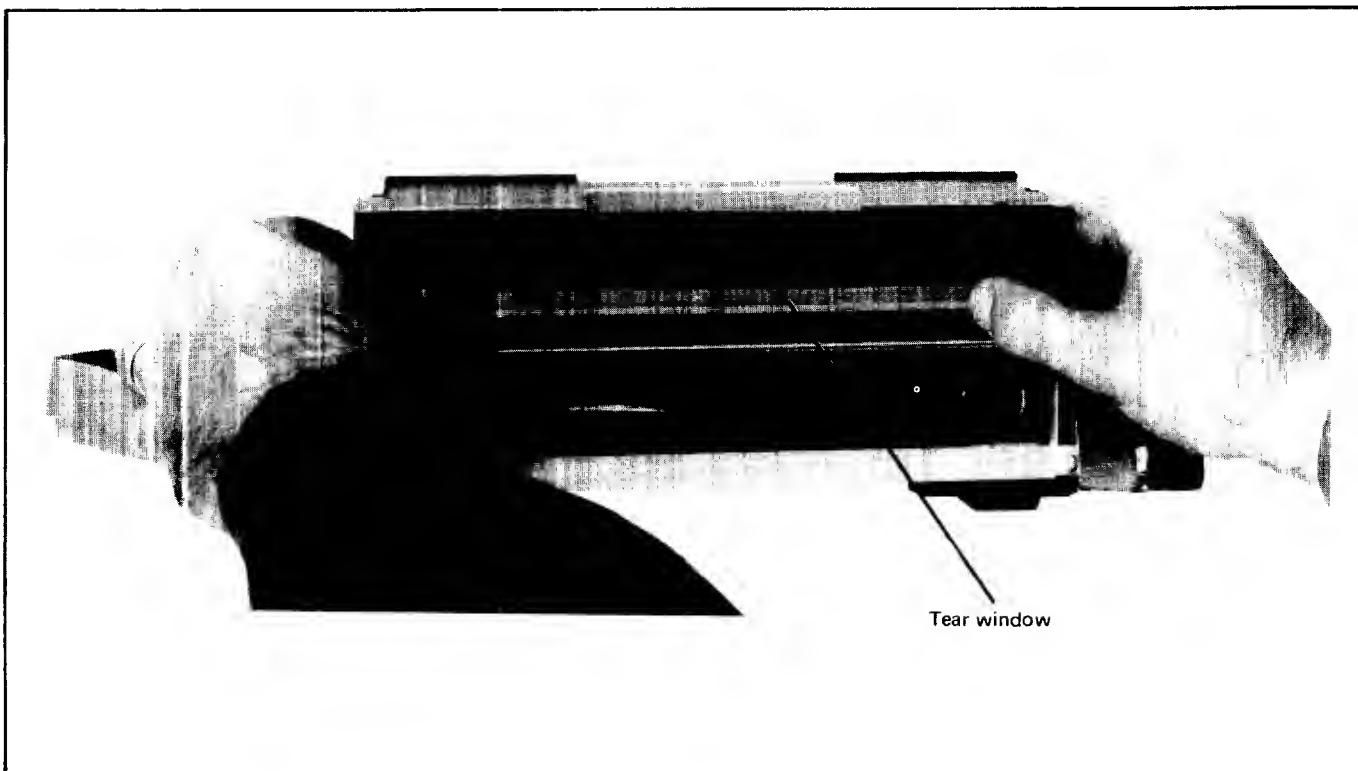


Figure 7-12 Tear Window

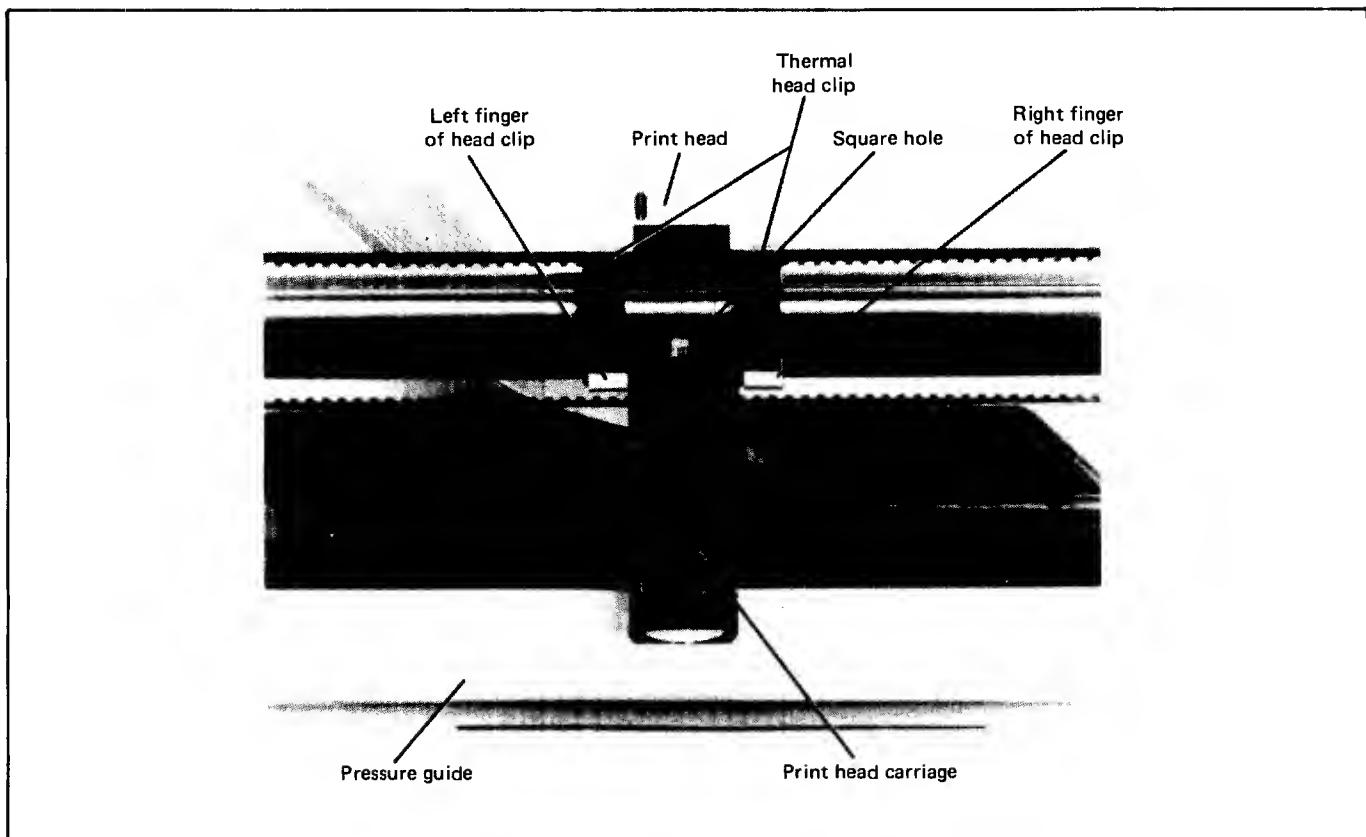


Figure 7-13 TPM Front View

4. Slide print head carriage down to the middle of the TPM (see figure 7-13).
5. Loosen right and left fingers of the thermal head clip which secures the print head in place (see figure 7-13).
6. Push the print head out from the print head carriage and down.
7. Pull the print head out of the print head carriage.
8. Slide the print head removal tool (part number 02620-00012) under the print head assembly connector and then insert it into the TPM PCA connector.
9. Unplug the connector end of the print head assembly.
10. Pull the print head assembly out of the thermal print mechanism.

**CAUTION**

When replacing the print head assembly do not bend the flex cable where it connects to the print head.

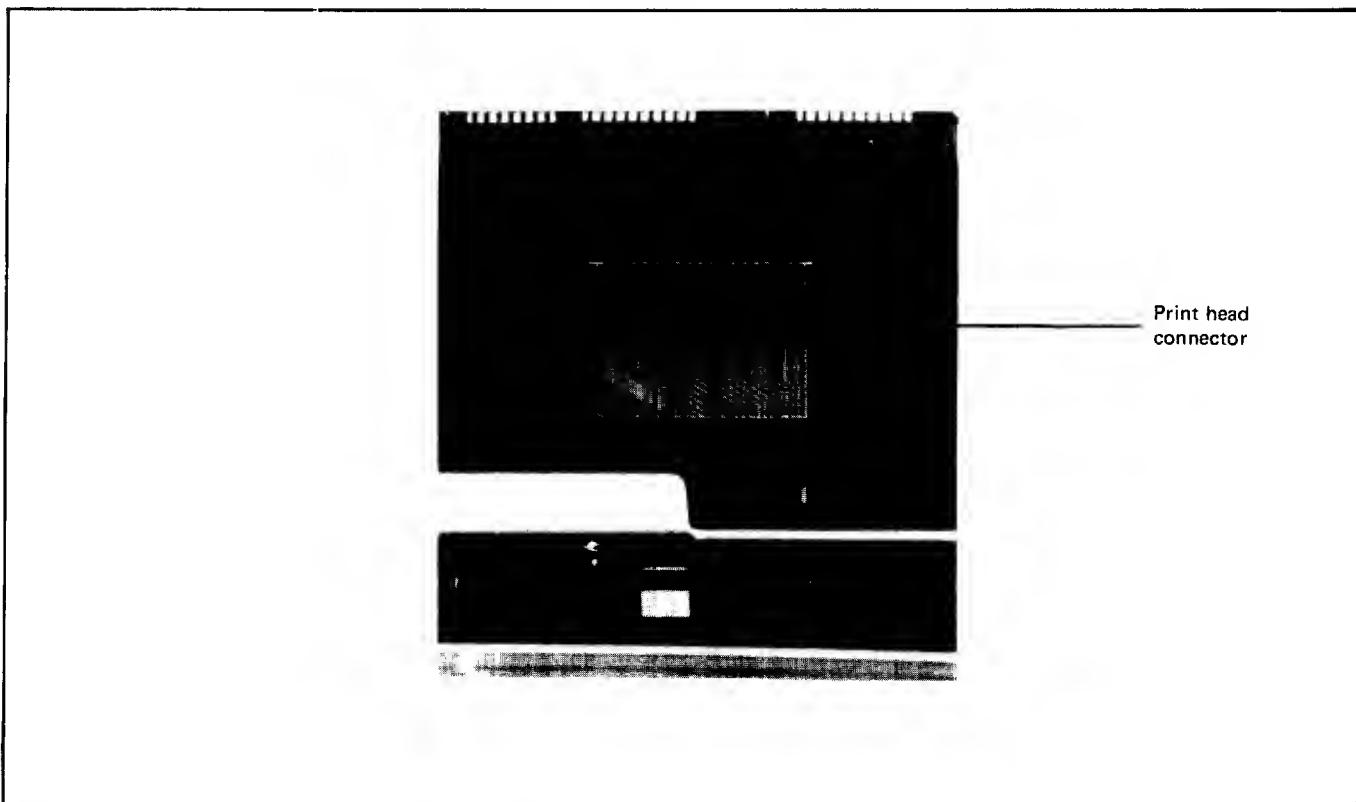


Figure 7-14 Print Head Assembly Connector

**REPLACEMENT.** Replace print head as follows:

1. Put the TPM on the edge of a table top with the pressure guide and print head carriage facing forward. The pressure guide needs to hang over the edge of the table (See figure 7-13).
2. Hold the print head so that the side which has one-half silver and one half black is facing you. Thread print head under pressure guide, between the pressure guide and black portion of TPM.
3. Slide the print head up the print head carriage between the print head carriage and the thermal head clip (see figure 7-13). Do not bend flex cable where it connects to the print head because the wires will break.
4. Pull the print head up until you can see some of the flex cable through the square hole in the front of the print head carriage. Then push the print head back down until it rests on the ledge on the inside of the print head carriage (see figure 7-15).
5. Look through the square hole of the print head carriage. Be sure that print head ceramic is seen in half of the square hole, and that the flex cable is seen in the other half of the square hole (see figure 7-13).

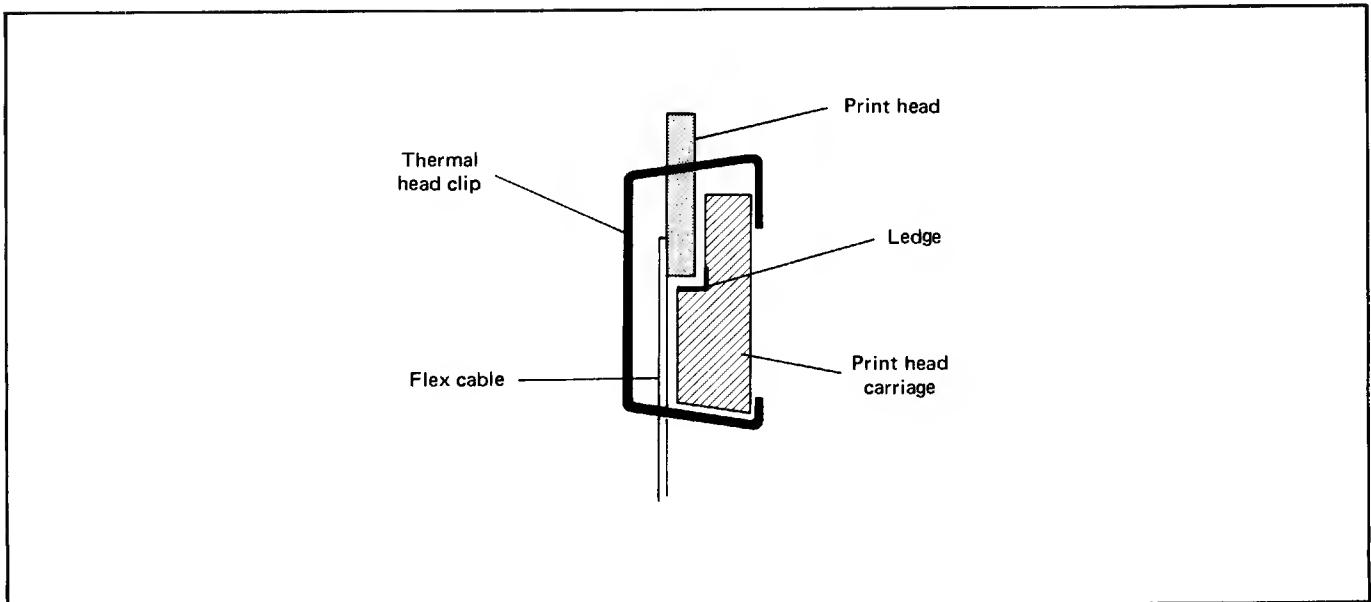


Figure 7-15 Ledge Inside Print Head Carriage

6. Latch the left and right fingers of the thermal head clip (see figure 7-13)
  7. Press the flex cable back inside of the TPM.
  8. Fold the new flex cable similarly to the defective flex cable and route it along the TPM trough (see figure 7-16).
- Note: To ensure correct folding of flex cable, the replacement cable has been previously creased.
9. With the insulated side up, install the flex cable into the TPM PCA connector (slot in TPM mainframe). Ensure that the flex cable is seated fully into TPM PCA connector and that the contacts of the print head cable assembly are aligned with the contacts on the TPM PCA. To be sure of perfect alignment, turn the TPM upside down to view the connection pin assignment (see figure 7-14).

Replace the TPM complete with new print head back into the terminal as follows:

1. Reconnect the two cable assemblies to their respective connectors (J2 and J3) and position TPM onto mainframe.
2. Slide TPM forward to attach the front hooks onto mainframe. Ensure that TPM is properly positioned at the front hooks and snap fastener holes in mainframe. Reconnect the ground wire.
3. Raise door latch and secure TPM in place by pushing inward on the two snap-in grommets and then the two snap-in plungers.
4. Replace removable rod.

5. Replace paper and paper roll rod.
6. Replace tear window.
7. Lower and secure door latch.
8. Replace cover and reconnect power cord.

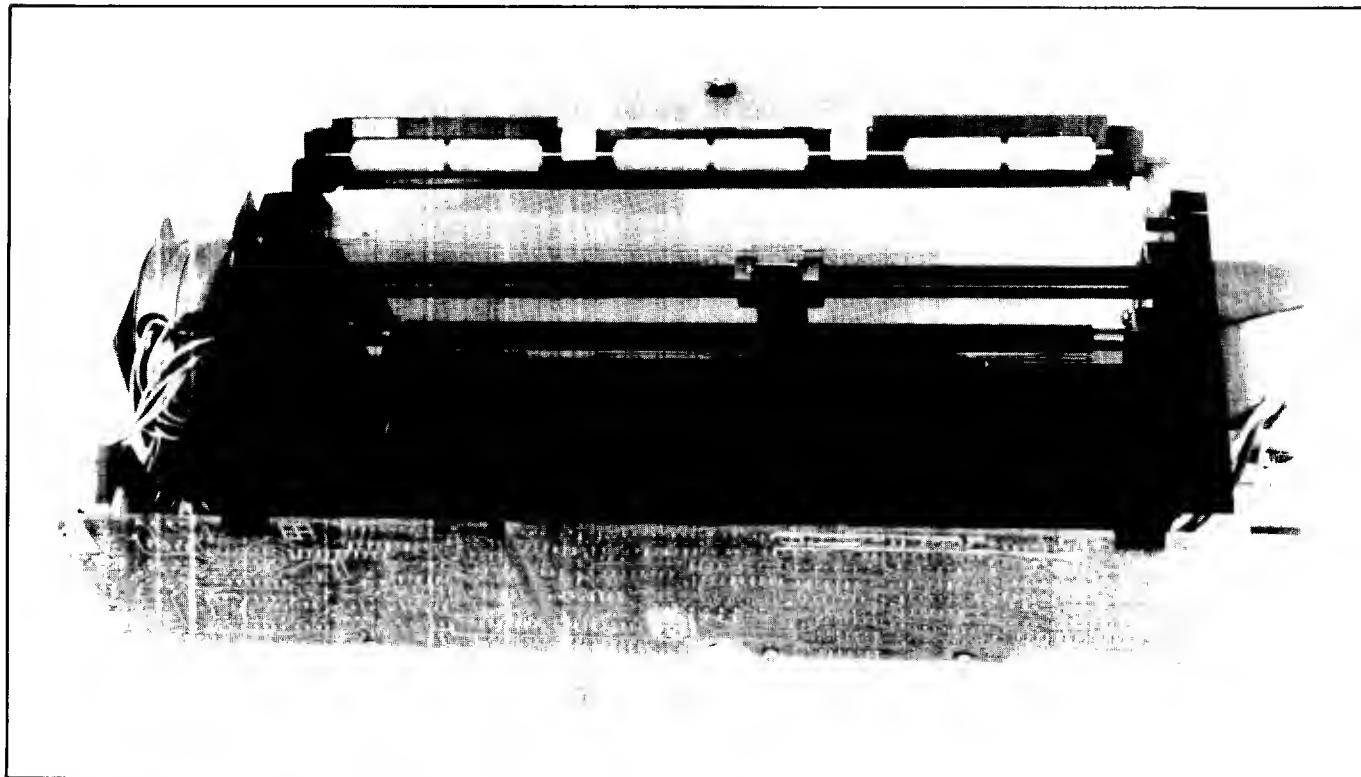


Figure 7-16 Print Head Assembly In Place

#### REMOVABLE PARTS

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Removable parts for the terminal are listed in tables 7-1 through 7-14. The removable parts in tables 7-1 through 7-4 are referenced to the exploded views (figures 7-17 through 7-20) of the terminal by index numbers.

Tables 7-13 and 7-14 give the part numbers for removable components shown in figure 7-28 and 7-29.

Tables 7-1 to 7-4 provide the following information for each part.

1. FIG.&INDEX NO. The figure and index number where the removable parts are shown in the exploded view.
2. HP PART NO. The Hewlett-Packard part number for each removable part.

3. DESCRIPTION. The description and any special application (accessories and options) for each removable part.
4. UNITS PER ASSY. The total quantity of each part used in the major assembly.

#### ORDERING REMOVABLE PARTS

To order removable parts for the terminal or options and accessories, address the order to your local Hewlett-Packard Sales and Service Office listed at the end of this manual. The following information should be included in the order for each part.

1. Complete terminal model number (including options and accessories) and serial number.
2. Hewlett-Packard part number.
3. Complete part description as provided in the removable parts list.

#### EXCHANGE MODULES

Exchange modules are replacement modules less some removable components. Table 7-15 lists the available exchange modules and the components that must be removed before a module is sent to Hewlett-Packard's Customer Service Division (CSD). These exchange modules are available from CSD under the "Board Exchange Program". The Customer Service Engineer can exchange a defective module for a replacement module at the prevailing exchange rate. Contact your local HP Sales and Service Office for details.

Table 7-1 Top Cover, Support And Pedestal

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO	DESCRIPTION
	2621B	2621B-050		
7-17				
1	1	1	4040-1480	*Pedestal
2	4	4	0624-0439	*Screw, tapping
3	4	4	3050-0099	*Washer, flat
4	6	6	0403-0284	*Foot, press-in
5	1	1	4040-1447	*Top prop
6		1	3160-0208	*Fan
7		2	2360-0129	*Screw, machine, 6-32x7/8
8		2	3050-0066	*Washer, flat, no.6
9		2	0400-0239	*Rubber foot
10		2	0380-0006	*Spacer
11		2	0360-1517	*Foam pad
12		1	1400-0611	*Clamp cable
13		1	02620-60172	*Fan cable

Table 7-2: Mainframe Module Assembly

FIG & INDEX NO.	UNITS PEP ASSY		UP PART NO.	DESCRIPTION
	2621B	2621B-050		
7-19				
1	1	1	4040-1486	*Chassis
2	1	1	2090-0050	*Cathode Ray Tube B/Wte
	1	1	2090-0063	*Cathode Ray Tube Green
3	1	1	2100-4150	*Yoke, Deflection
4	1	1	02620-60122	*CRT Base Cable Assembly
5	4	4	0624-0440	*Screw, tapping, 10-14 x 5/8
6	1	1	0360-1934	*Lug, quick disconnect
7	1	1	4040-1478	*Bezel
8	10	10	0624-0413	*Screw, tapping, #16 x 1/2
9	1	1	02620-60100	*Processor PCA (less ROM's)
10	5	7	1390-0104	*Snap Fastener Insert
11	5	7	1390-0281	*Tall Snap Fastener
12	1	1	02620-60121	*Logic Power Cable Assy
13	3	3	2200-0107	*Screw, machine
14	3	3	2190-0078	*Lockwasher
15	1	1	0360-1263	*Lug, quick discon., rt. angle
16	2	2	4040-1957	*Extender (short)
17	1	1	4040-1956	*Extender (long)
18	1	1	02620-80102	*Jumper board
19	1	1	02620-60103	*Power Panel Assembly
		1	02620-60027	*Power Panel Assembly
20	1	1	1400-0965	*Battery Support
21	1	1	02620-60004	*Power Supply PCA
	1	1	2110-0043	Fuse 1.5A 250V (std)
		1	2110-0063	Fuse 0.75A 250V (used for option 015)
		1	02620-60019	*Power Supply PCA
		1	2110-0010	Fuse, 5A, 250V (standard)
		1	2110-0083	Fuse, 2.5A, 250V (used for option 015)
22	1		02620-60120	Transformer Assembly
23	2	4	1600-0776	Bracket, PC Board
24	2	2	1390-0464	Quarter-Turn Receptacle
25		1	02620-60127	TPM Power Cable
26		1	8120-2805	TPM Cable
27	1	1	1400-0611	Cable Clamp
28	1	1	4040-1479	Top Cover
		1	4040-1481	TPM Top Cover
29		1	4040-1482	TPM Door
30	1	1	7121-2077	Nameplate (2621B)
	1	1	7121-2990	Nameplate (2629L)

Continued ....

Table 7-2: Mainframe Module Assembly (Continued)

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	2621B	2621B-050		
7-18				
31	4	4	4040-1949	Cover
32	3	3	02620-60080	Quarter Turn Assy
33	3	3	1390-0427	Quarter-Turn Retainer
34		1	02620-60081	Ground Cable Printer
35	4	4	02620-20002	Spacer
36	1	1	4040-1484 8120-1378	Support Power cord set NEMA5/CEE (Std)

Note 1. Data Communications Cable (refer to installation Section for fabricating and parts information)

Table 7-3 Thermal Print Mechanism

FIG & INDEX NO.	UNITS PER ASSY	HP PART NO.	DESCRIPTION
7-19		02670-60015	Mechanical assembly, less items 2,19,26.
1	1	02670-40003	*Mainframe
1a	2	1390-0450	Snap Fastener
1b	2	1390-0104	Snap Fastener insert
2	1	02670-60050	*TPM PCA
3	3	2360-0125	*Screw, machine
4	1	1600-0758	*Door Latch
5	1	0624-0364	*Screw,no.4-20 x .25in.
6	1	3050-0100	*Washer.flat no.4
7	1	02670-40005	*Latching Frame
8	2	1600-0757	*Clip,platen holder
9	2	0624-0364	*Screw,tapping no.2-28
10	1	1531-0021	*Shaft. idle roller
11	1	02670-60007	*Platen Assembly
12	1	1531-0019	*Rod.paper roll
13	1	02670-40007	*Tear Window
14	1	1531-0022	*Rod, removable
15	1	1530-2154	*Shaft, rubber drive
16	1	02670-60052	*Guide, paper
	1	9270-0638	*Paper, Thermal

Continued ...

Table 7-3 Thermal Printer Mechanism (Continued)

FIG & INDEX NO.	UNITS PER ASSY	HP PART NO.	DESCRIPTION
7-19			
17	1	1531-0017	*Shaft, head carriage
18	1	1530-0520	*Belt, timing
19	1	02670-60014	*Print Head Cable Assembly
20	1	1600-0761	*Clip, Head
21	1	1600-0755	*Guide, pressure
22	1	02670-40001	*Plate, left end
23	1	02670-60002	*Motor, Print Head Assy
24	1	02670-40002	*Plate, right end
25	1	3140-0613	*Motor, Paper Step
26	1	8160-0309	*Shield, Magnetic
27	1	02670-60005	*Microswitch Assembly
28	1	02670-60004	*Solenoid Assembly
29	1	1460-1683	*Spring, Solenoid

Table 7-4 Keyboard Assembly

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	2621B	2621B-050		
7-20				
1	1	1	02620-40001	**Keyboard Top
2	1	1	02620-40002	**Keyboard Base (Attaching parts)
3	1	1	02620-60123	**Keyboard Inner Mode (USASCII keycaps)
4	4	4	0624-0400	**Screw, Tapping no. 6-19
5	4	4	0403-0285	**Rubber Bumper
7	1	1	8120-3432	**Keyboard Cable Assy
8	2	2	4040-1948	**Strain relief
9			0460-0030	**Industrial Tape

Table 7-5 gives the key caps which are common to all of the languages (USASCII and National). The position of these keys on the keyboard may be different in the US and national versions.

Table 7-5 USASCII And National Set Keycaps

UNITS PER ASSY	HP PART NO	DESCRIPTION
1	0371-1219	A Keycap
1	0371-1220	B *Keycap
1	0371-1221	C Keycap
1	0371-1222	D Keycap
1	0371-1223	E Keycap
1	0371-1224	F Keycap
1	0371-1225	G Keycap
1	0371-1226	H Keycap
1	0371-1227	I 5 Keycap
1	0371-1228	J 1 Keycap
1	0371-1229	K 2 Keycap
1	0371-1230	L 3 Keycap
1	0371-1231	M 0 Keycap
1	0371-1232	N Keycap
1	0371-1233	O 6 Keycap
1	0371-1234	P Keycap
1	0371-1235	Q Keycap
1	0371-1236	R Keycap
1	0371-1237	S Keycap
1	0371-1238	T Keycap
1	0371-1239	U 4 Keycap
1	0371-1240	V Keycap
1	0371-1241	W Keycap
1	0371-1242	X Keycap
1	0371-1243	Y Keycap
1	0371-1244	Z Keycap
1	0371-1245	1 ! Keycap
1	0371-1248	4 \$ Keycap
1	0371-1249	5 % Keycap
1	0371-1255	- _ Keycap
1	0371-1266	ESC DEL Keycap
1	0371-1267	BACKSPACE Keycap
1	0371-1268	CAPS Keycap
1	0371-1269	CTRL Keycap
1	0371-1270	ENTER Keycap
1	0371-1271	NUM Keycap

Continued ...

Table 7-5 USASCII And National Set Ketcaps (Continued)

UNITS PER ASSY	HP PART NO	DESCRIPTION
1	0371-1272	BREAK Keycap
1	0371-1273	TAB <> Keycap
1	0371-1274	SHIFT Keycap
1	0371-2367	RETURN Keycap
1	0371-1276	Blank (LABELS) Keycap
1	0371-1277	Space Bar Keycap
1	0371-1278	(Homeup) Keycap
1	0371-1279	(Homedown) Keycap
1	0371-1280	ROLL (up) Keycap
1	0371-1281	ROLL (down) Keycap
1	0371-1282	< Keycap
1	0371-1283	> Keycap
1	0371-1284	(up) Keycap
1	0371-1285	(down) Keycap

The following tables give the ADDITIONAL keycaps which are also required to build a complete keyboard for each language. Changing the language of a keyboard will simply consist in checking the "new language" table against the "old language" table for missing keycaps and re-arranging the keycaps.

Table 7-6 USASCII Keycaps

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1246	2 @ Keycap
1	0371-1247	3 # Keycap
1	0371-1250	6 ^ Keycap
1	0371-1251	7 & Keycap
1	0371-1252	8 * Keycap
1	0371-1253	9 ( Keycap
1	0371-1254	0 ) Keycap
1	0731-1256	= + Keycap
1	0371-1257	' ~ Keycap
1	0371-1258	[ { Keycap
1	0371-1259	] } Keycap
1	0371-1260	\   Keycap
1	0371-1261	; : Keycap
1	0371-1262	', " Keycap
1	0371-1263	, < Keycap
1	0371-1264	. > Keycap
1	0371-1265	/ ? Keycap

Table 7-7 Swedish/Finish Keycaps - Option 001

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1247	3 # Keycap
1	0371-1864	2 " Keycap
1	0371-1865	8 ( Keycap
1	0371-1866	9 ) Keycap
1	0371-1867	0 - Keycap
1	0371-1868	, ; Keycap
1	0371-1869	. : Keycap
1	0371-1870	6 & Keycap
1	0371-1871	7 / Keycap
1	0371-1872	+ ? Keycap
1	0371-1873	É Keycap
1	0371-1874	< > Keycap
1	0371-1875	Å Keycap
1	0371-1876	Ü Keycap
1	0371-1877	' * Keycap
1	0371-1878	Ö Keycap
1	0371-1879	Ä Keycap

Table 7-8 Danish/Norwegian Keycaps - Option 002

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1247	3 # Keycap
1	0371-1257	\ ~ Keycap
1	0371-1864	2 " Keycap
1	0371-1865	8 ( Keycap
1	0371-1866	9 ) Keycap
1	0371-1867	0 - Keycap
1	0371-1868	, : Keycap
1	0371-1869	. : Keycap
1	0371-1870	6 & Keycap
1	0371-1871	7 / Keycap
1	0371-1872	+ ? Keycap
1	0371-1874	< > Keycap
1	0371-1875	Å Keycap
1	0371-1877	' * Keycap
1	0371-1880	@ ^ Keycap
1	0371-1881	AE Keycap
1	0371-1882	Ø Keycap

Table 7-9 French Keycaps - Option 003

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1864	2 " Keycap
1	0371-1865	8 ( Keycap
1	0371-1866	9 ) Keycap
1	0371-1867	0 - Keycap
1	0371-1868	, ; Keycap
1	0371-1869	. : Keycap
1	0371-1871	7 / Keycap
1	0371-1874	< > Keycap
1	0371-1883	3 § Keycap
1	0371-1884	6 + Keycap
1	0371-1885	' ? Keycap
1	0371-1886	^ .. Keycap
1	0371-1887	` £ Keycap
1	0371-1888	à ç Keycap
1	0371-1889	& * Keycap
1	0371-1890	é è Keycap
1	0371-1891	ù o Keycap

Table 7-10 German Keycaps - Option 004

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1864	2 " Keycap
1	0371-1865	8 ( Keycap
1	0371-1866	9 ) Keycap
1	0371-1867	0 - Keycap
1	0371-1868	, ; Keycap
1	0371-1869	. : Keycap
1	0371-1870	6 & Keycap
1	0371-1871	7 / Keycap
1	0371-1874	< > Keycap
1	0371-1876	Ü Keycap
1	0371-1878	Ö Keycap
1	0371-1879	Ä Keycap
1	0371-1883	3 § Keycap
1	0371-1892	ß ? Keycap
1	0371-1893	' ` Keycap
1	0371-1894	£ ^ Keycap
1	0371-1895	+ * Keycap

Table 7-11 United Kingdom Keycaps - Option 005

UNITS PER ASSY	HP PART NO	DESCRIPTION
1	0371-1257	' ~ Keycap
1	0371-1258	[ { Keycap
1	0371-1259	] } Keycap
1	0371-1260	\   Keycap
1	0371-1864	2 " Keycap
1	0371-1865	8 ( Keycap
1	0371-1866	9 ) Keycap
1	0371-1867	0 - Keycap
1	0371-1868	, ; Keycap
1	0371-1869	. : Keycap
1	0371-1870	6 & Keycap
1	0371-1872	+ ? Keycap
1	0371-1874	< > Keycap
1	0371-1896	3 £ Keycap
1	0371-1897	7 ^ Keycap
1	0371-1898	' / Keycap
1	0371-1899	* @ Keycap

Table 7-12 Spanish Keycaps - Option 006

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1257	' ~ Keycap
1	0371-1864	2 " Keycap
1	0371-1865	8 ( Keycap
1	0371-1866	9 ) Keycap
1	0371-1867	0 - Keycap
1	0371-1868	, ; Keycap
1	0371-1869	. : Keycap
1	0371-1870	6 & Keycap
1	0371-1872	+ ? Keycap
1	0371-1874	< > Keycap
1	0371-1898	' / Keycap
1	0371-1899	* @ Keycap
1	0371-1900	3 £ Keycap
1	0371-1901	7 i Keycap
1	0371-1902	o { Keycap
1	0371-1903	# } Keycap
1	0371-1904	ñ Keycap

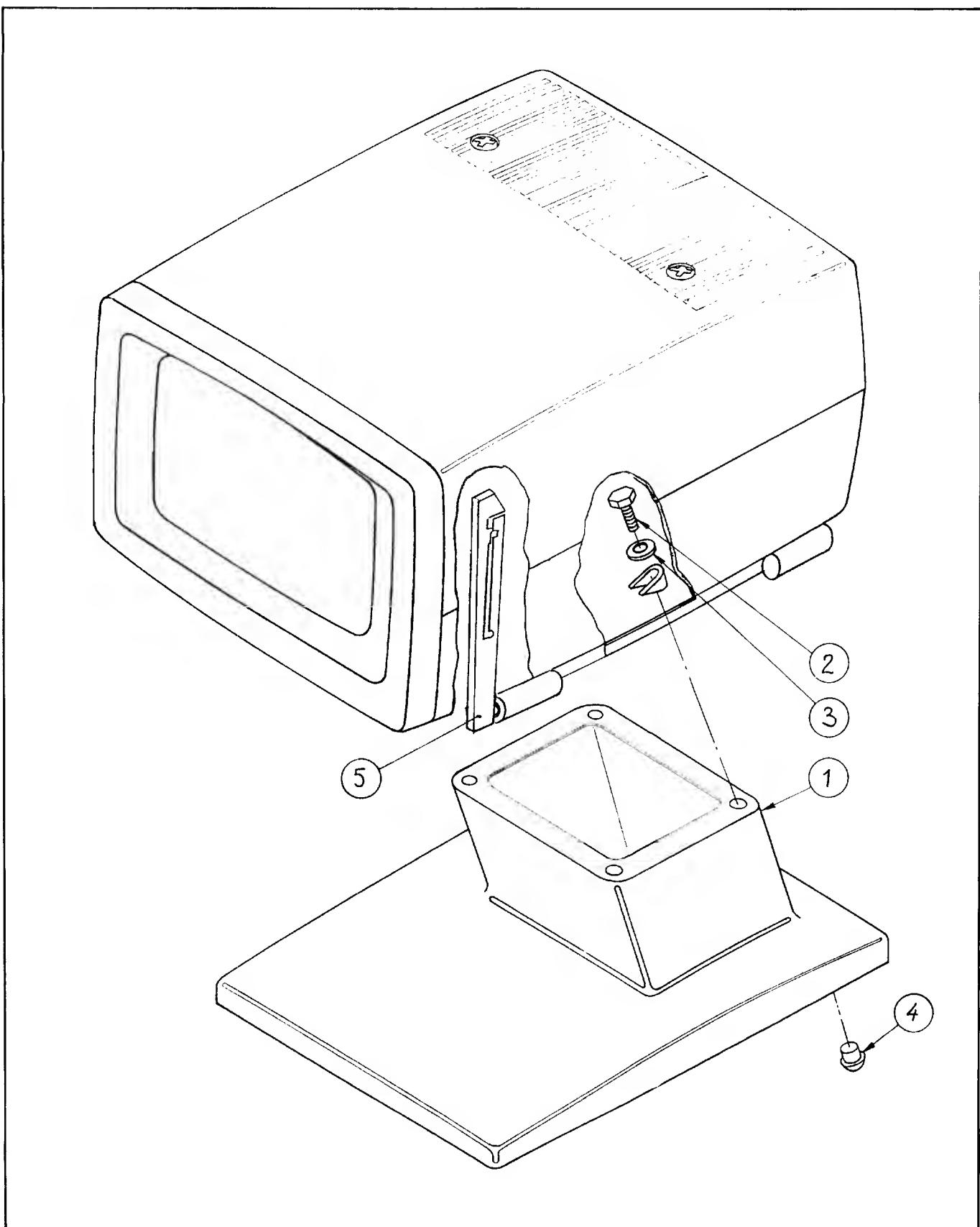


Figure 7-17A Top Cover, Support And Pedestal - standard terminal

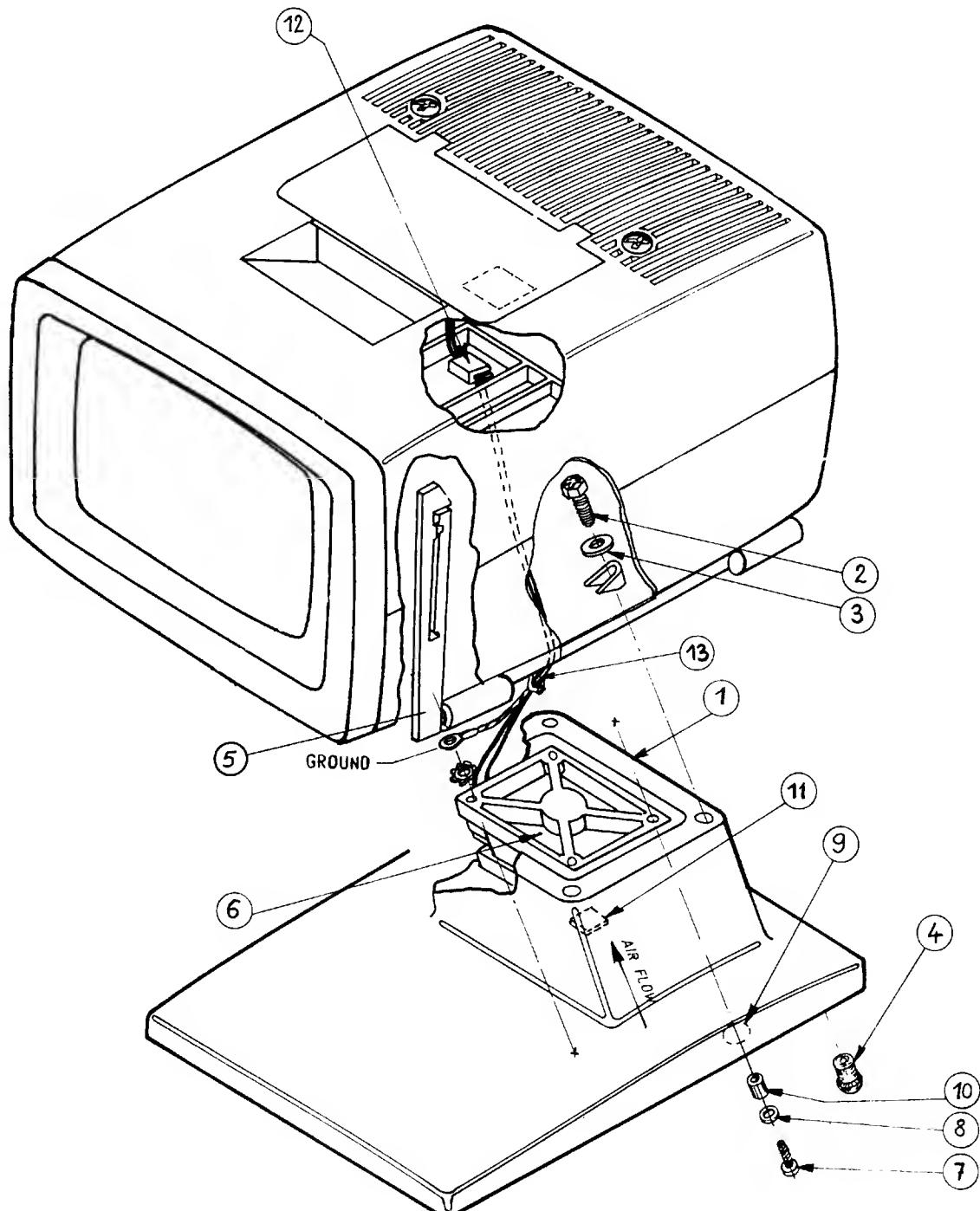


Figure 7-17B Top Cover, Support And Pedestal - option 050 (printer)

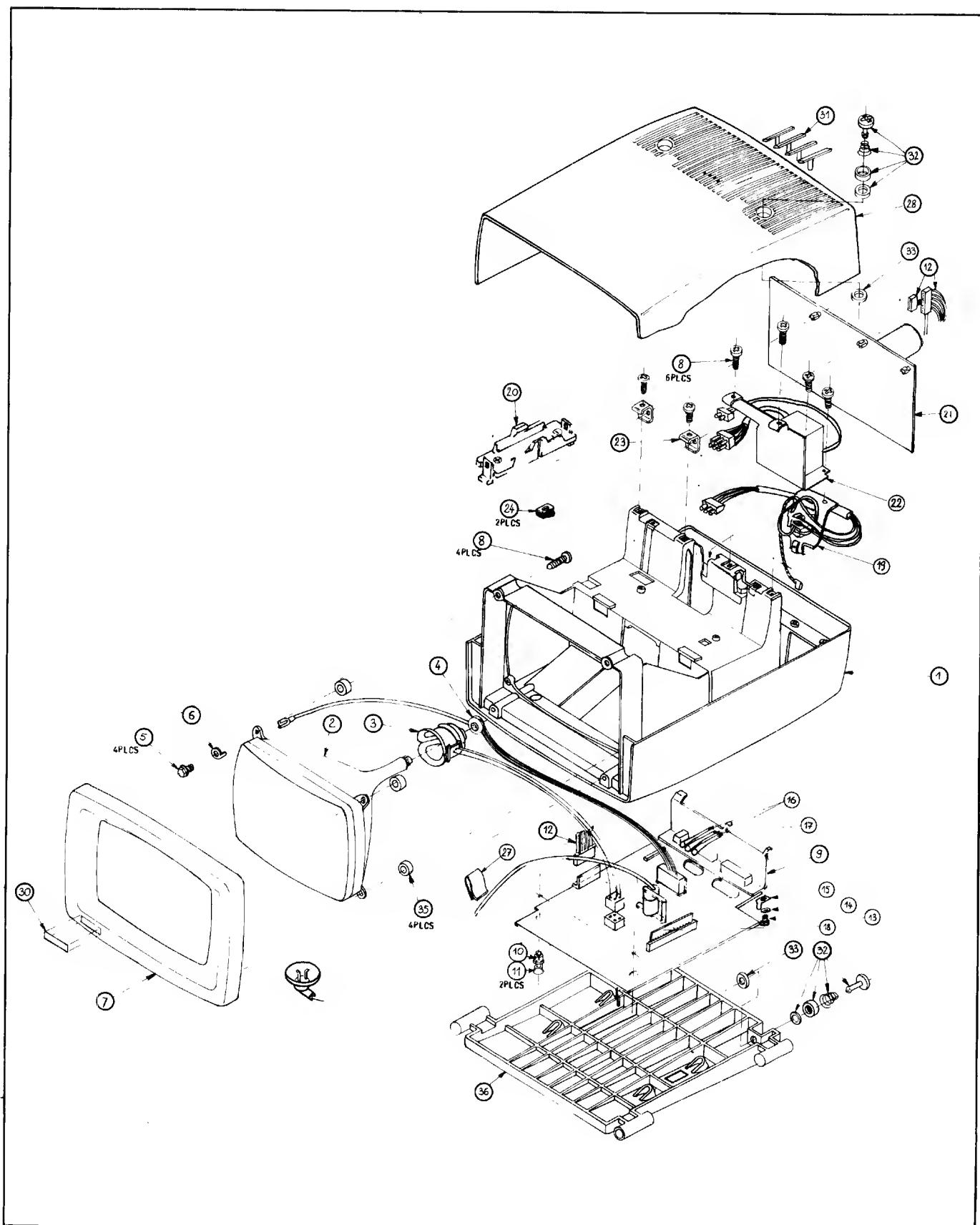


Figure 7-18A Mainframe Module Assembly - standard terminal

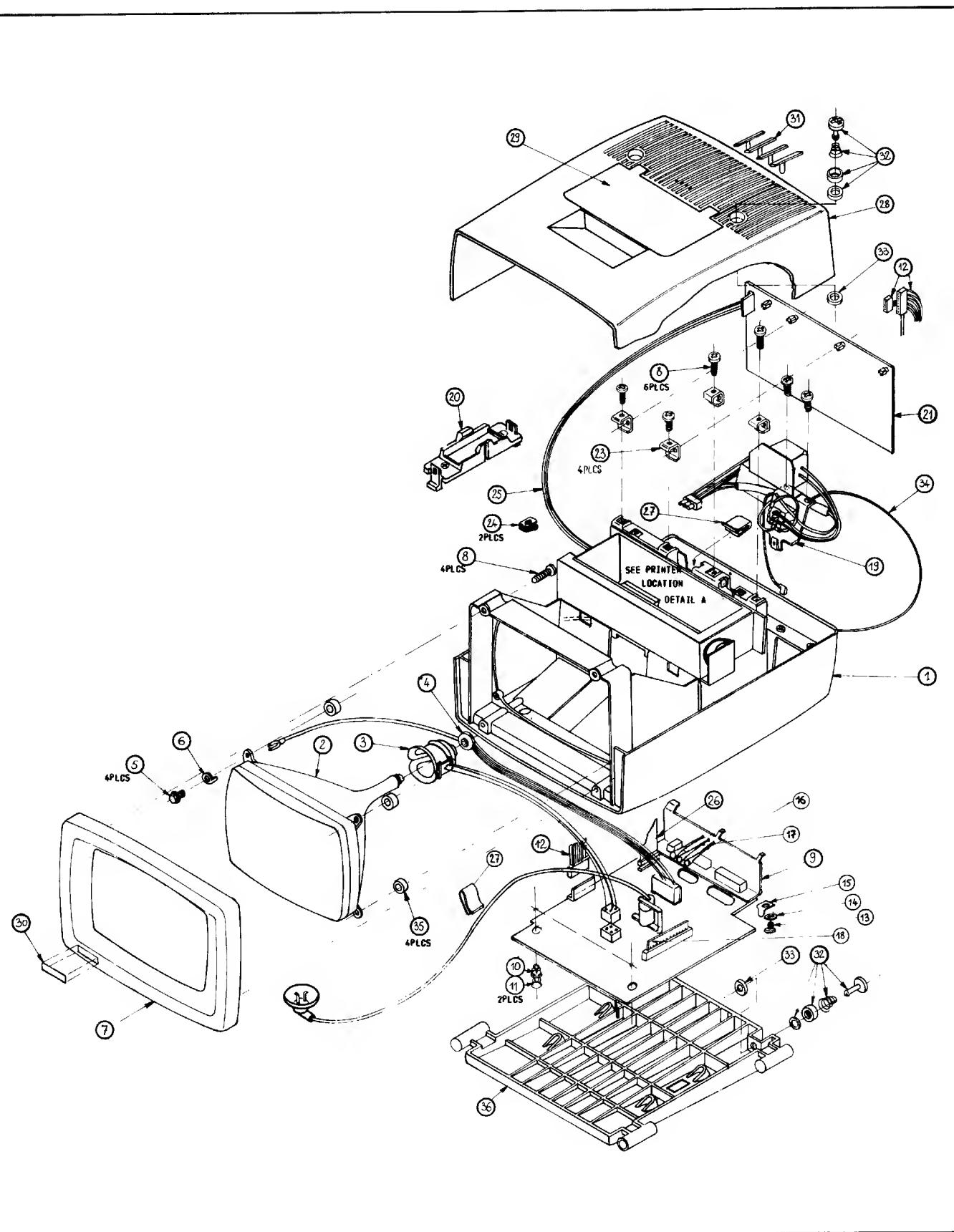


Figure 7-18B Mainframe Module Assembly - option 050 (printer)

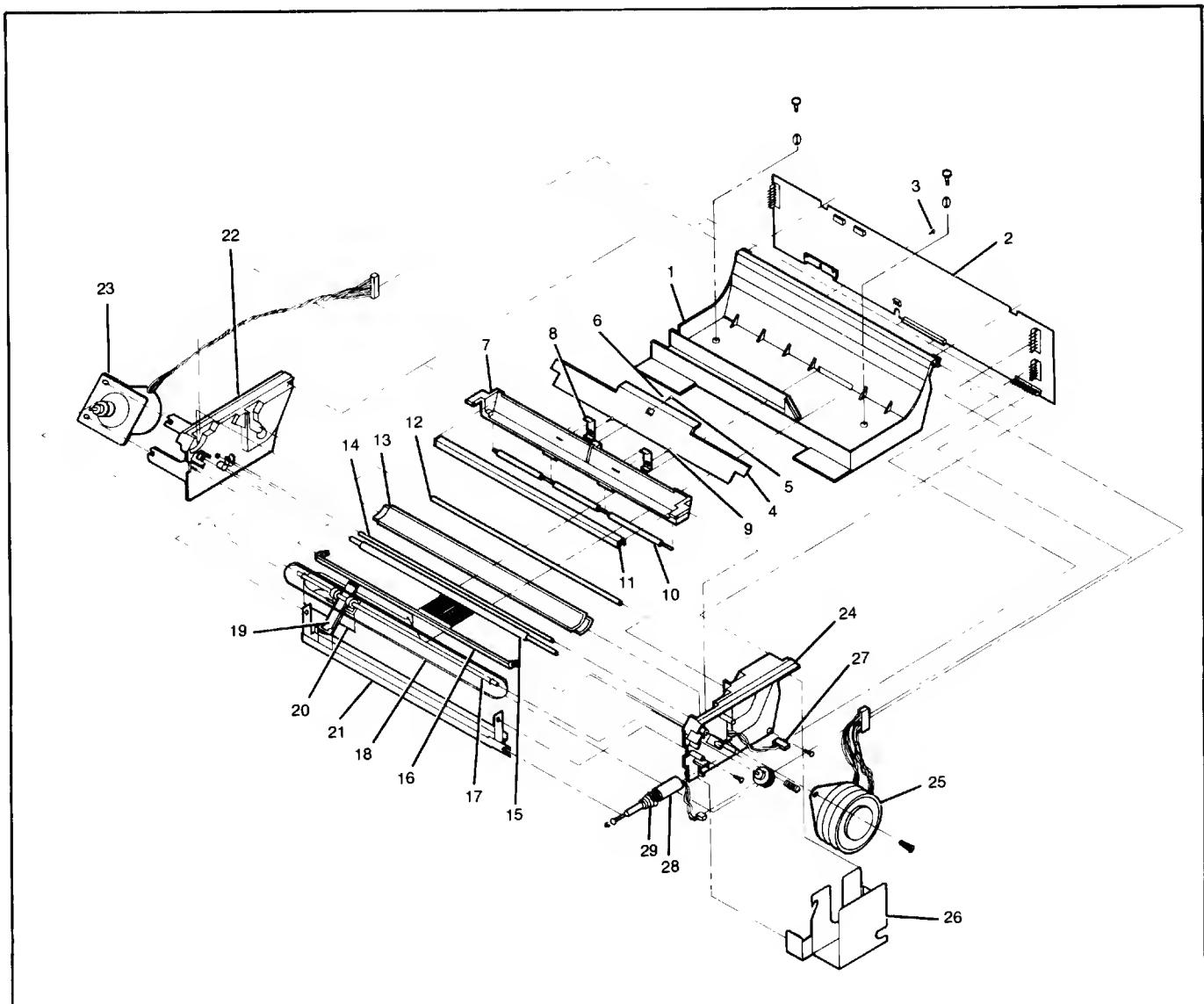


Figure 7-19 Thermal Printer Mechanism

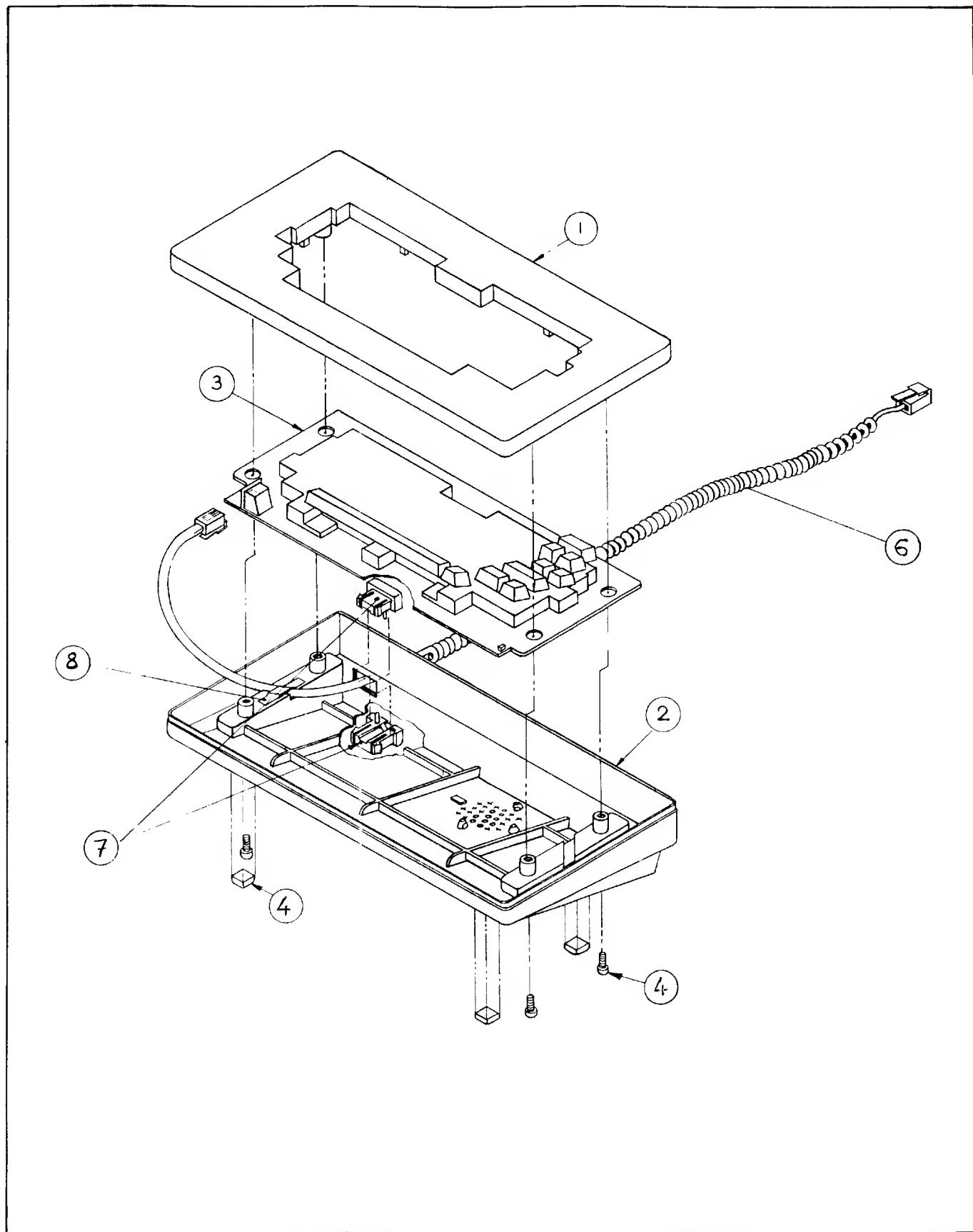


Figure 7-20 Keyboard Assembly



Figure 7-21 USASCII Keyboard



Figure 7-22 Swedish/Finish Keyboard - Option 001

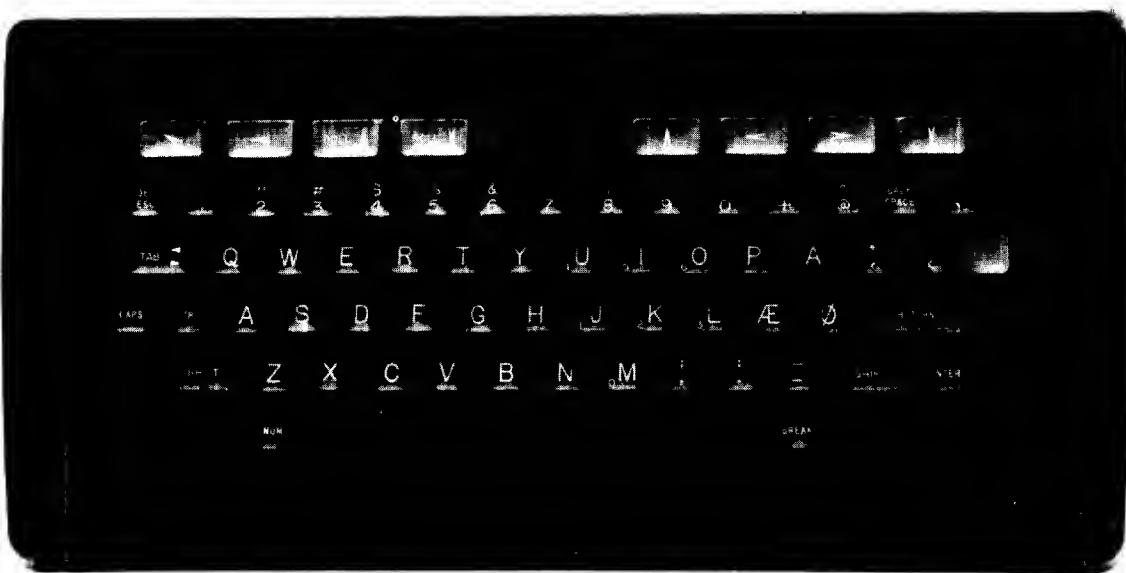


Figure 7-23 Danish/Norwegian keyboard - Option 002

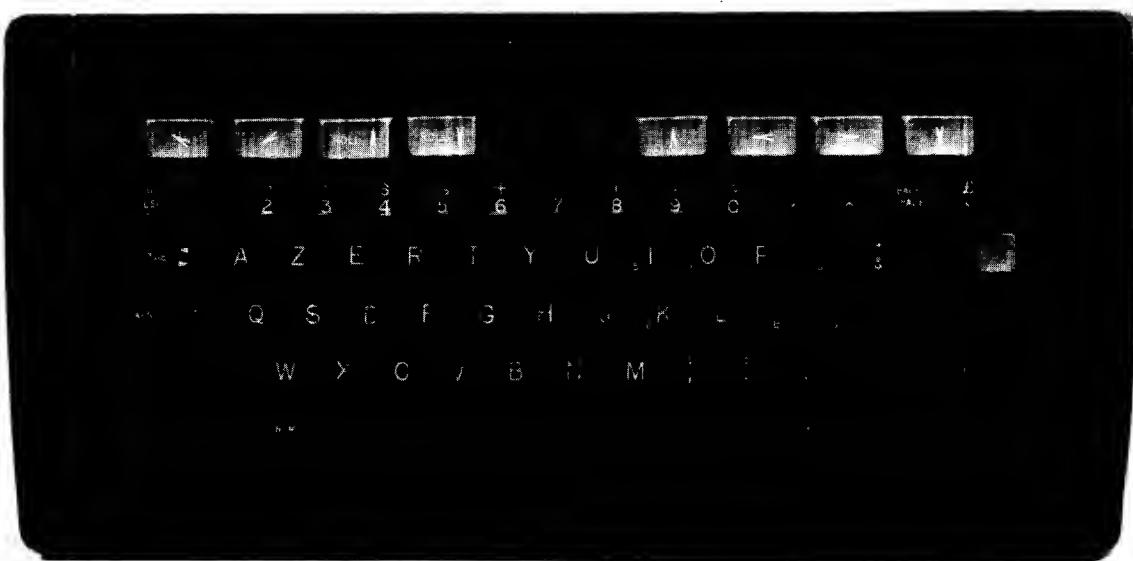


Figure 7-24 French keyboard (AZERTY) - Option 003

Note: Keycaps A and Z are exchanged with Q and W respectively in the French QWERTY keyboard.

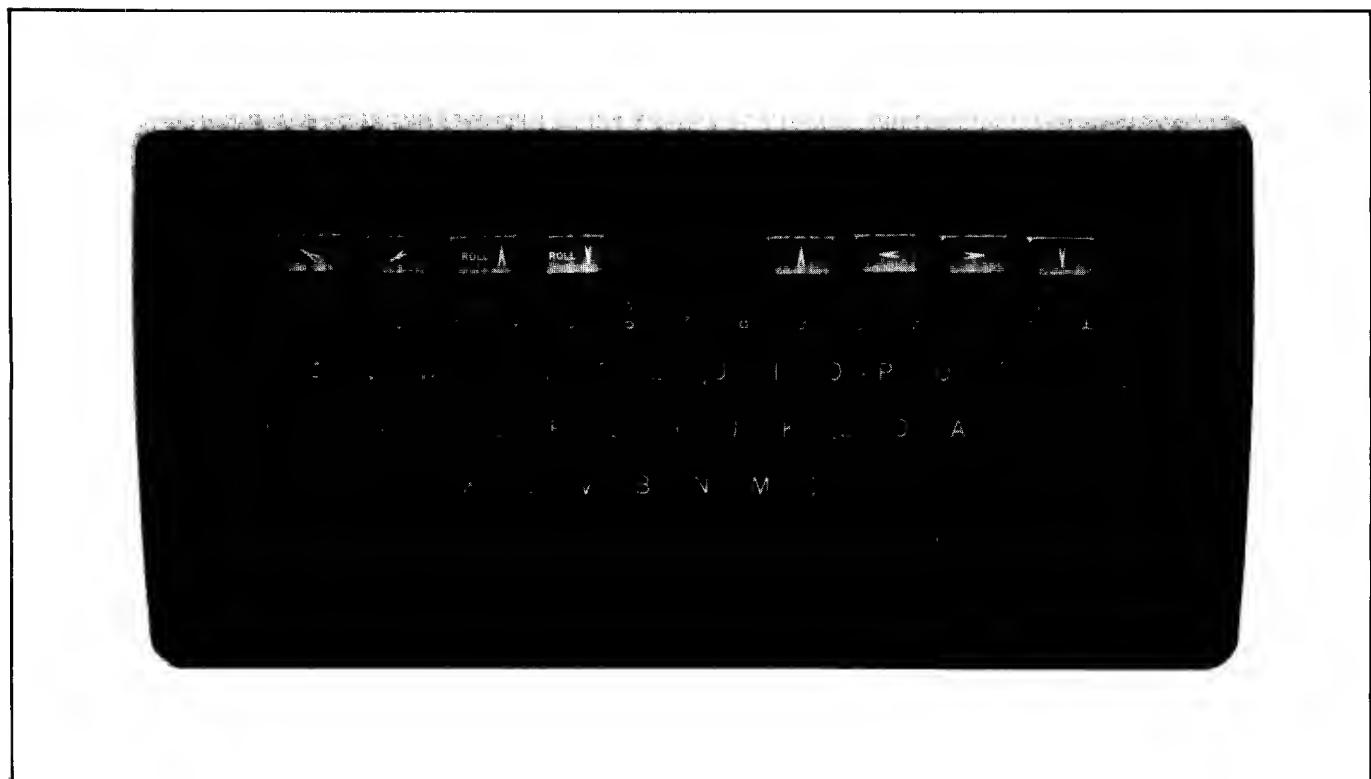


Figure 7-25 German Keyboard - Option 004

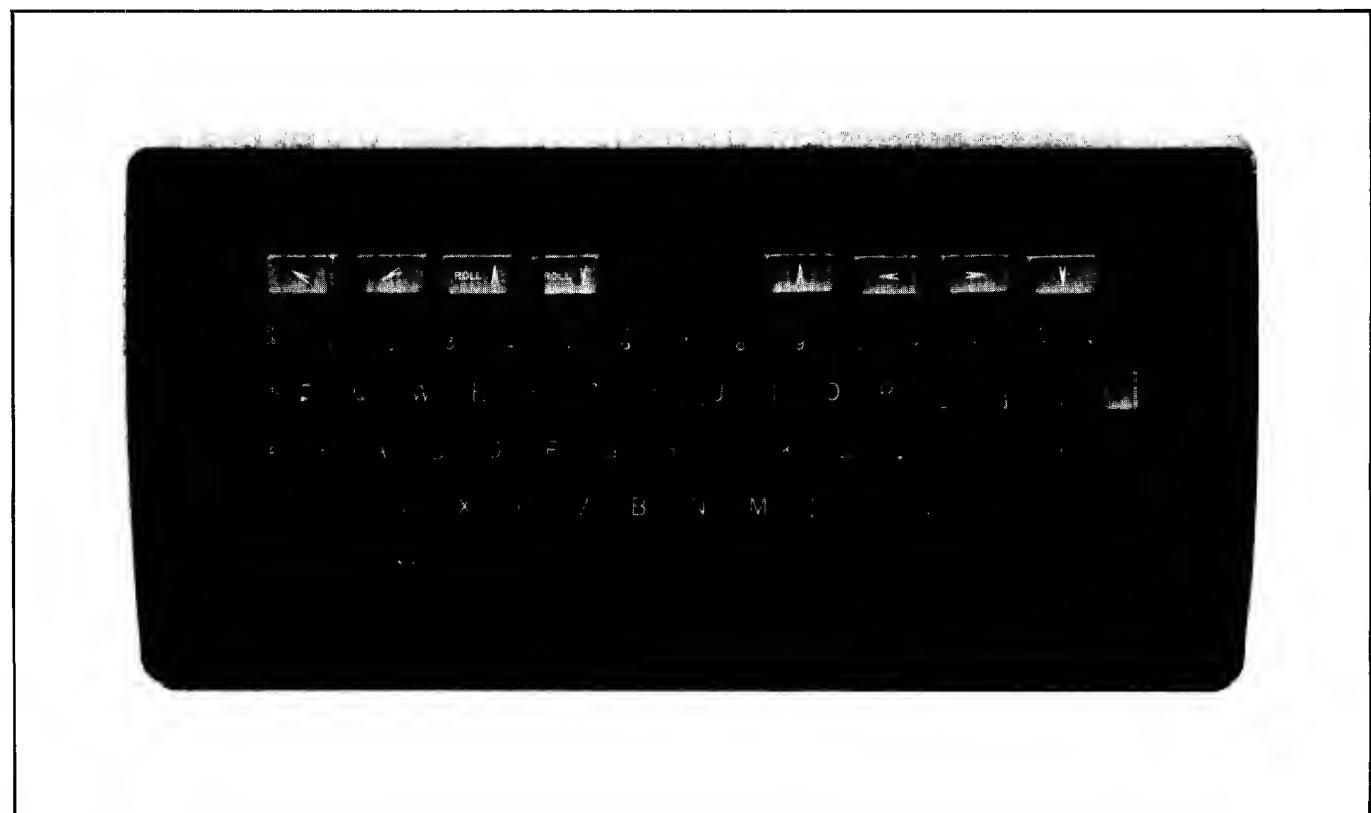


Figure 7-26 United Kingdom Keyboard - Option 005

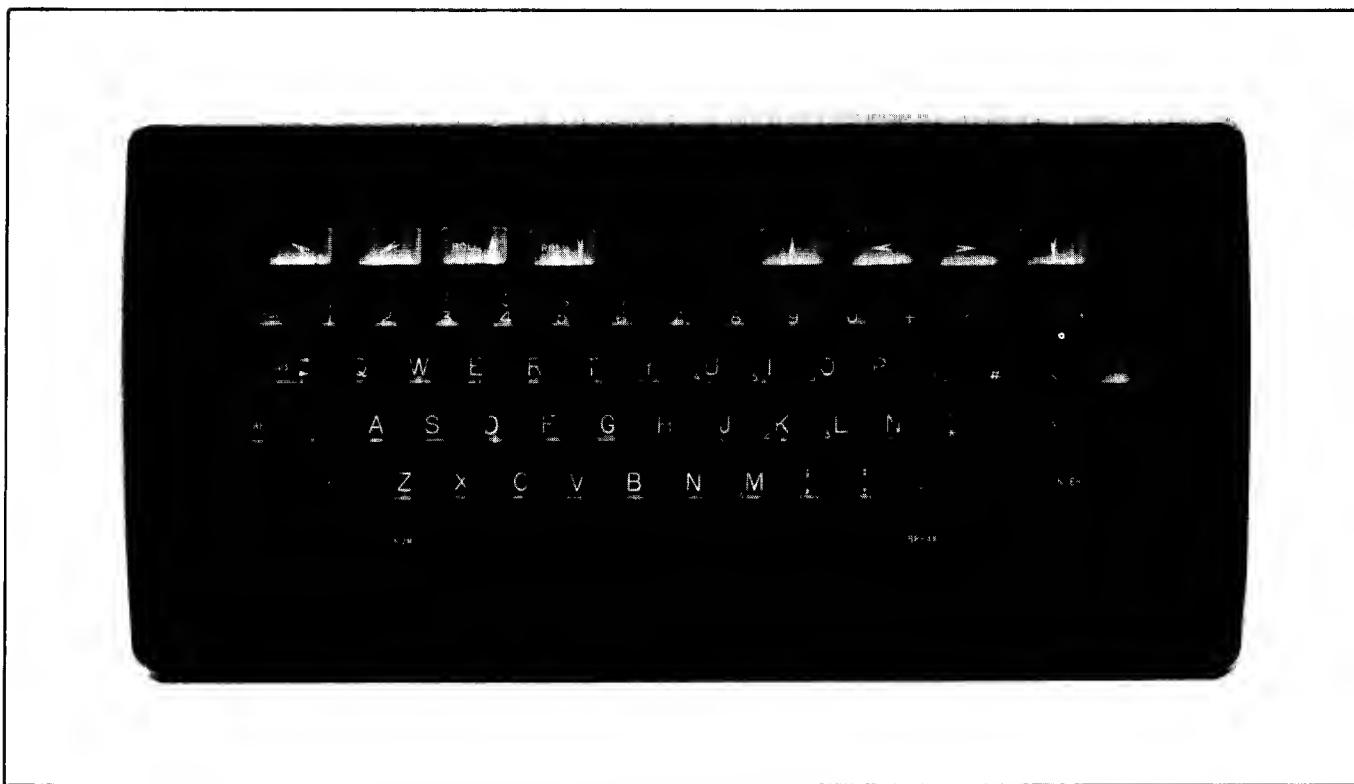


Figure 7-27 Spanish Keyboard - Option 006

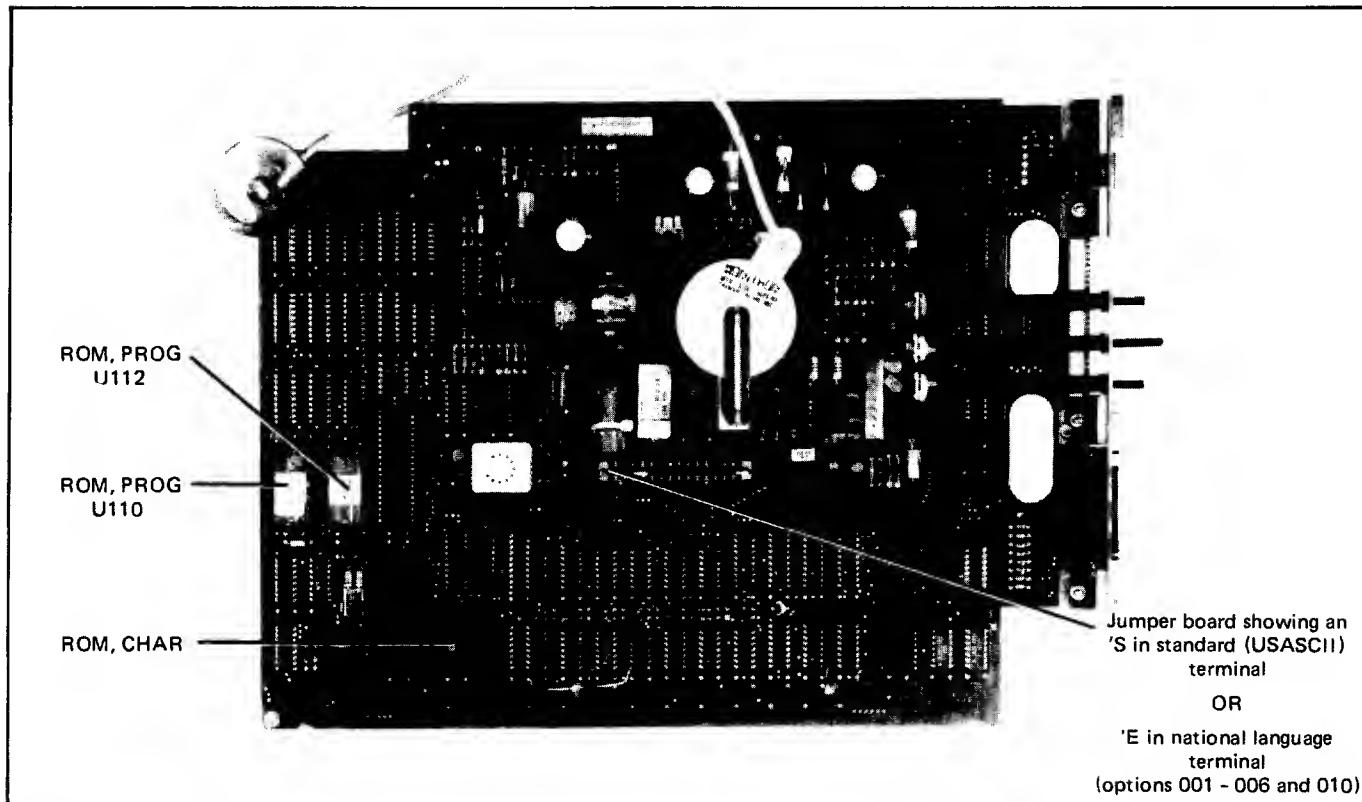


Figure 7-28 Processor PCA

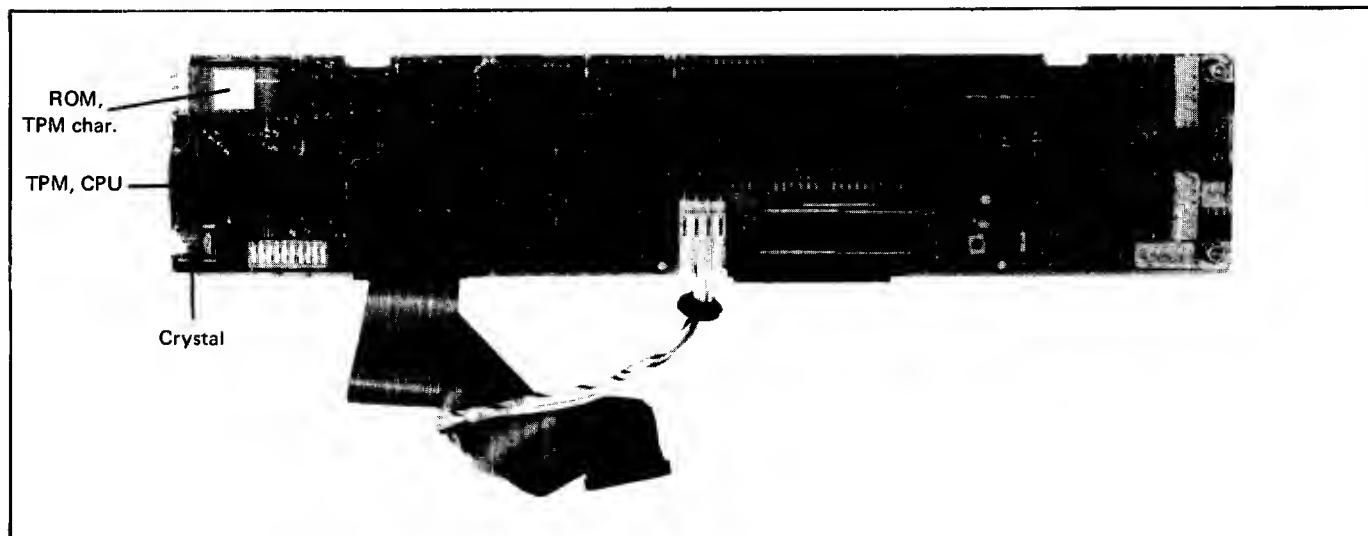


Figure 7-29 TPM PCA

02620-60100  
1818-1771  
1818-1772  
1818-1847  
02670-60050  
1818-0981  
or 1818-0763  
1820-2196  
0410-1189

Table 7-13 Removable Components Standard Terminal

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	02620-60100	* Processor (Attaching parts)
1	1818-1771	**ROM, CHAR USASCII
1	1818-1772	**ROM, PROG STD 8K U112
1	1818-1847	**ROM, PROG 4K* (*only if fitted with integral printer opt.050) U110
1	02670-60050	*TPM PCA (Attaching parts)
1	1818-0981 or 1818-0763	**ROM, TPM CHAR
1	1820-2196	**ROM, TPM, CPU
1	0410-1189	**Crystal 6MHZ

Table 7-14: Removable Components  
National Options 001-006 And 010

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	02620-60100	*Processor PCA (Attaching parts)
1	1818-1846	**ROM, PROG NAT 8K U112
1	1818-1847	**ROM, PROG NAT 4K U110
1	1818-1773	**ROM, CHAR NAT
1	02670-60050	*TPM PCA
1	1818-0981	**ROM, TPM CHAR
1	1820-2196	**ROM, TPM, CPU
1	1820-1189	**Crystal, 6MHZ

Table 7-15 Exchange Modules

HP PART NO.	DESCRIPTION	TERMINAL	
		2621B	2621B-050
02620-69100	*Processor PCA - see note 2 (less Assembly & Components listed below) **Character ROM **Program ROM Code **Program ROM Code -----x-----	1	1
02620-69004	*Power Supply PCA 2621B **(Less Fuse) Note: When installed in the terminal, the fuse should always be in position X1 -----x-----	1	1
02620-69019	*Power Supply PCA 2621B-050 **(Less Fuse) -----x-----		1
02620-69092	*Keyboard PCA -----x-----	1	1
02670-69050	*TPM PCA (Less Components listed below)		1
Y1	**Crystal 6 MHz		1
U11	**Character ROM		1
U21	**Processor 8048		1
02670-69015	*TPM Mechanical Assembly (Less Assemblies listed below)		1
02670-60050	**TPM PCA		1
02670-60014	**Print Head and Cable Assy		1
8160-0309	**Magnetic Shield		1

\* Exchange module  
\*\* These components or assemblies must be removed.

## Note:

- 1) The keyboard PCA must include all the USASCII keycaps (see figure 7-21 for the layout).
- 2) When replacing the processor PCA:
  - a) On the standard (USASCII) terminal, ensure the 'S on the small jumper PCA (02620-80102) faces you.
  - b) On the national terminal (option 001-006 or 010), ensure the 'E on the small jumper PCA (02620-80102) faces you.

## FUNCTIONAL OPERATION

## SECTION 8

## INTRODUCTION

This section contains a brief block diagram discussion of the terminal. A functional block diagram of the terminal is shown in figure 8-1 and 8-2. The terminal consists of a Processor PCA, Power Supply and Keyboard Module.

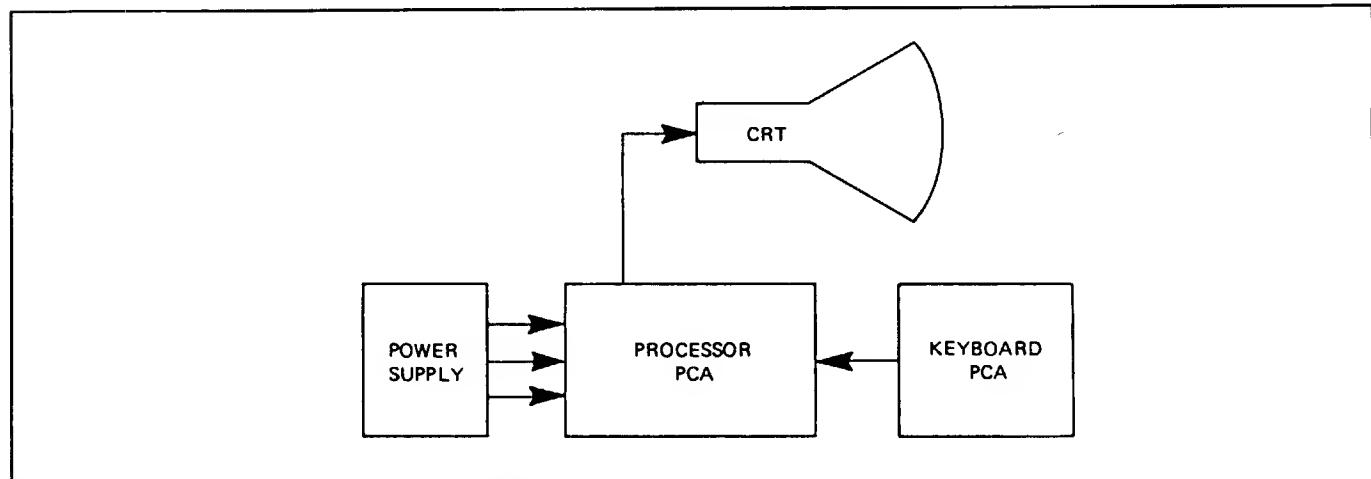


Figure 8-1 2621B Simplified Block Diagram

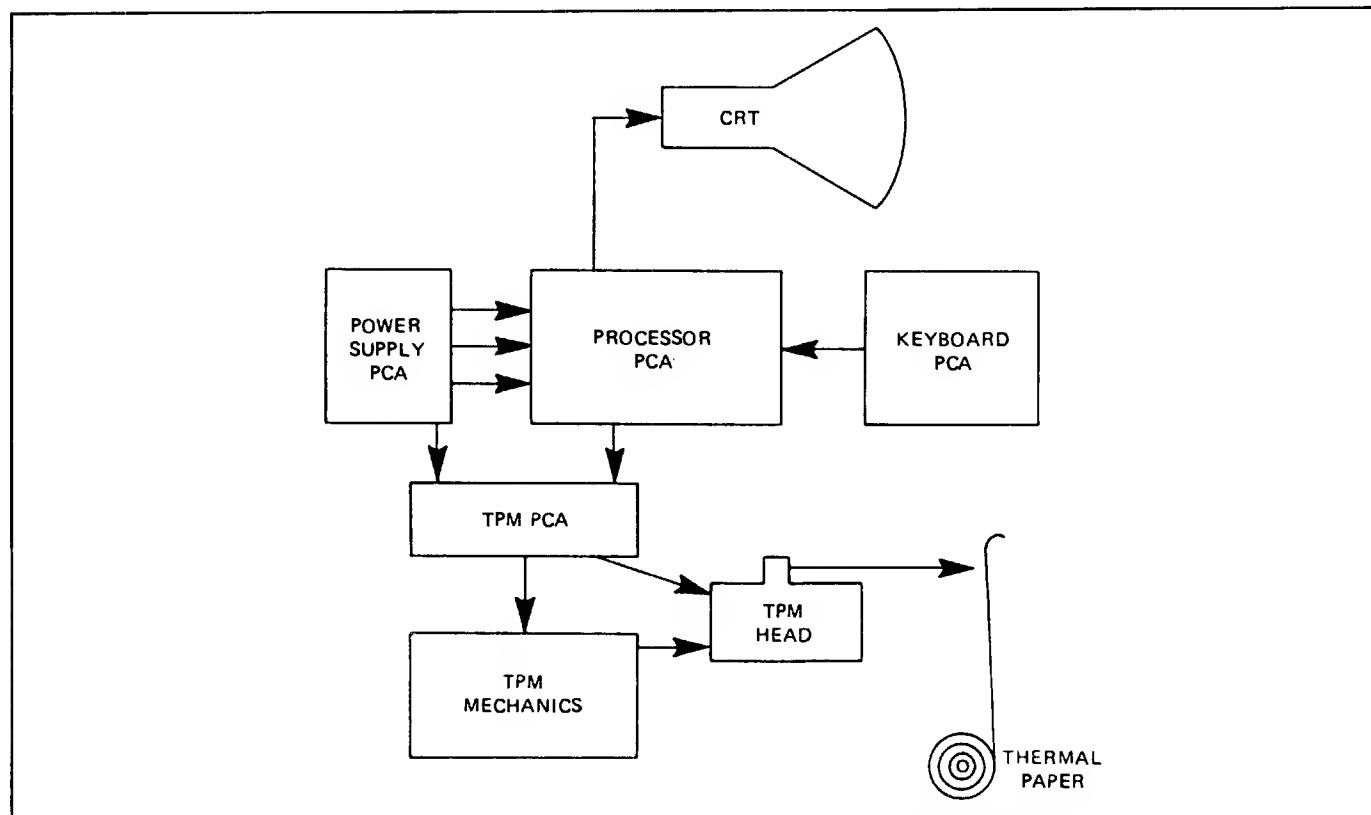
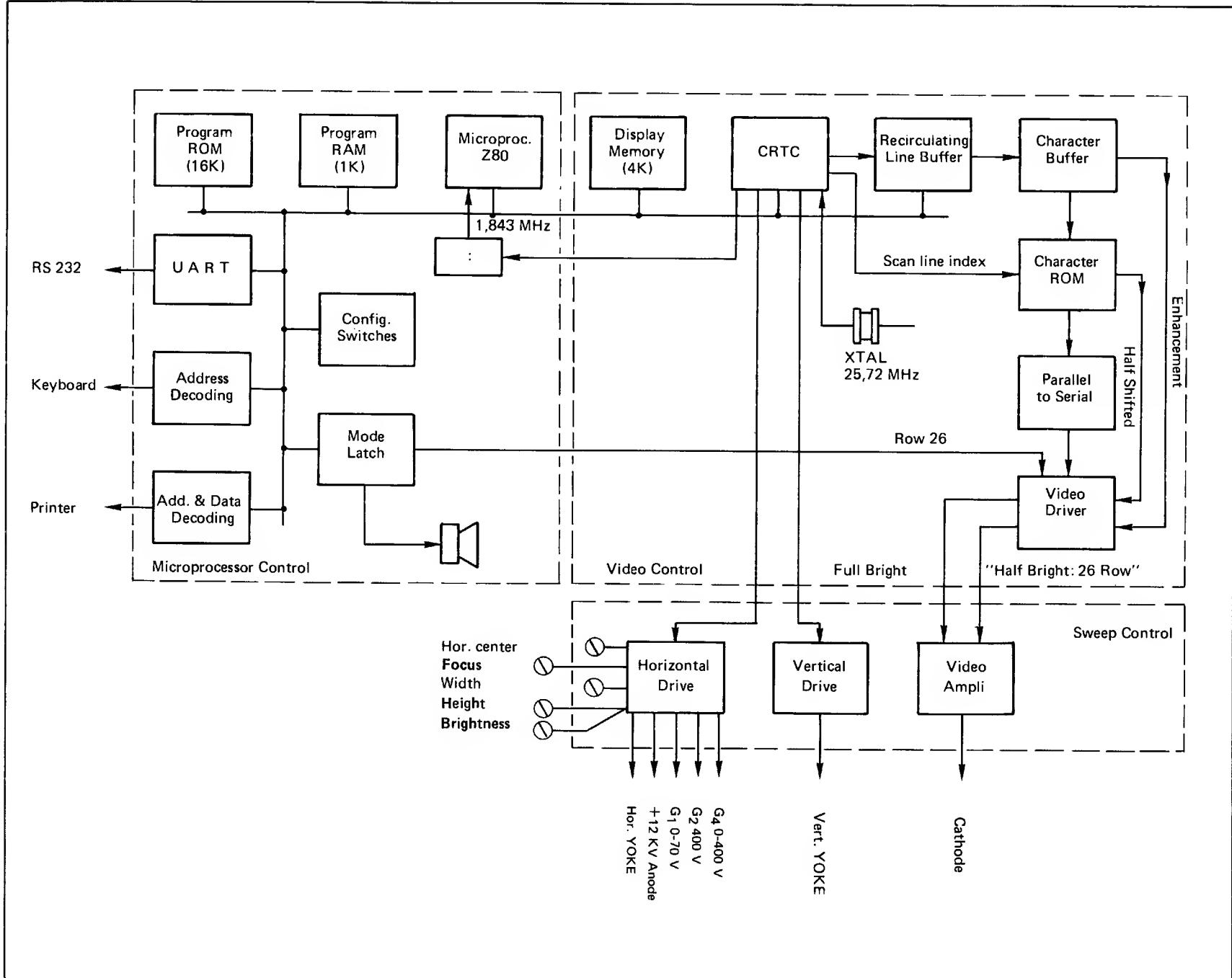


Figure 8-2 2621B Option 050 Simplified Block Diagram

Figure 8-3 Processor PCA Block Diagram  
98



## THE PROCESSOR PCA

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The processor PCA is divided into three functional sections: the microprocessor control, Video control, and the sweep control. Figure 8-3 shows a block diagram of the Processor.

### MICROPROCESSOR CONTROL

The microprocessor control consists of seven sections: Z80 Microprocessor, Program ROM, Program RAM, Mode Latch, UART, Configuration switches, address and data lines decoding. Description of these subsections follows:

#### Z80 Processor

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The Z80 Processor operates with a 1.8432 MHz clock supplied by a 25.77 MHz crystal through the CRT controller and a divider. Communication of the Z80 with peripherals is made through memory mapping. The address space of the processor is decoded in 8K byte increments and is allocated as shown in table 8-1.

Table 8-1 Processor Address

ADDRESS RANGE	DEVICE
0000-1FFF	Program ROM1
2000-3FFF	Program ROM2; 4K bytes only are used
4000-5FFF	Not used
6000-7FFF	Display memory; 4K bytes only are used
8000-9FFF	Program RAM (system overhead; soft keys, 1K byte only is used).
A000-BFFF	UART, Keyboard, Printer control, Mode Latch, Configuration switches.
C000-DFFF	CRT Controller
E000-FFFF	Printer

---

#### Program ROM

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There are two IC sockets, each of which may receive an 8K byte ROM. The standard terminal has only one 8K ROM. The code for the printer is contained in a second 4K ROM; this second ROM also contains part of the firmware necessary for national options.

#### Program RAM

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This 1K byte RAM is made from two IC's and is used as a scratch pad by the Z80 processor. It also contains the character strings assigned to the soft keys.

### Mode Latch

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This 4 bit register is used as a "WRITE ONLY" register by the firmware to define and control some functions of the hardware, such as : Buzzer control, UART enabling, RS232C signal control (CH) and 26th line display.

### UART

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This IC is driven by the same clock as the Z80 and performs serial to parallel data conversion for RS232 data reception, detects parity framing and overrun errors. The data to transmit is received from the Z80, for a parallel to serial conversion. The UART also supplies RS232 signals like CD, RQS, CTS.

### Configuration Switches

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These switches are read by the firmware to define the mode of operation of the terminal. The Z80 accesses these switches by means of a READ from addresses A900, AA00, and AB00.

### Address and Data Bus Decoding

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These are sets of address decoders used to drive the keyboard and the optional printer. Several addresses are reserved to reset, scan or read the keyboard, and to send a character to the printer.

### VIDEO CONTROL

The video control consists of a CRT controller (CRTC), display memory, one recirculating line buffer, a character buffer, a character ROM, a parallel-to-serial converter, and a video drive. It operates automatically to display any data present in portions of display memory selected by the Z80A and firmware. As input it receives from the Z80A three addresses: top-of-page, row-start for a character row, and the cursor address. Its output is a serial stream of dots which is supplied to the Sweep control to produce the display.

The display screen is divided into 26 rows of 80 character cells each. Each character cell is a rectangle, 15 dots vertical by nine dots horizontal. For normal (not inverse) video, if a character cell is occupied by a character, the dots used to shape the character are lighted, the others remaining blank. The display is produced by sweeping an electron beam horizontally across the screen for 390 sweeps (scan lines) from top to bottom. To produce a row of 80 characters, 15 scan lines are required. As the electron beam sweeps a scan line, it lights the appropriate dots in each character cell required to produce

the character. The dots to be lighted are determined by a stream of logic 1's and 0's (referred to hereafter as a dot stream) applied to the cathode of the CRT as the scan line is swept. After the screen has been swept by 390 scan lines, the beam is diverted from the bottom to the top of the screen and the sweep of the screen is repeated.

#### CRT Controller (CRTC)

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Each character row to be displayed on the screen is represented in display memory by one block of 80 bytes. To select a row of characters for display on the screen, the Z80 sends to the CRTC the address in display memory of the first character of the row. The CRTC then decrements this address to access the following characters.

#### Display Memory

---

Display Memory contains the characters and the enhancement for display on the screen; 7 bits are reserved for the ASCII code of the character and the 8th bit is used to turn on the enhancement (inverse video or underline). For national options, this 8th bit indicates that the character is a character in the Extended Roman character set. This causes another section of the character ROM to be accessed.

#### Recirculating Line Buffer

---

One character row at a time is read by the CRTC in display memory and stored in this 80 byte buffer. This buffer is then recirculated 15 times (once for each scan line of the row) to produce a row of characters on the screen. After the current row has been displayed, the recirculating buffer will be loaded with the characters of the next row by the CRTC.

#### Character ROM

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As the characters are recirculated, they are sent one at a time to the character ROM via the character buffer. The character ROM, which is kept informed of the current scan line by the CRTC, generates the 7 bit dot pattern needed to form the portion of the character for the current scan line. The 8th bit is used to "half shift" the 7-bit dot pattern when necessary. When output from the character ROM, this dot pattern is in parallel form. It is converted to serial form by the parallel-to-serial converter.

#### Video Driver

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The serial dot stream from the parallel-to-serial converter may be altered by the video driver. This includes : delay of half a dot period

(half shift), invert or force an underline to visualize the cursor and the enhancement selected, force an inverse video in row 26. For the standard terminal, the cursor position is materialized by an underline or by forcing inverse video; this is obtained by setting the 8th bit of the memory byte corresponding to the position of the cursor. For the national options, the cursor is obtained by replacing the code of the character at the cursor position with the code of the underline character, then switching back to the original code, and so forth.

#### SWEET CONTROL

The sweep control consists of three subsections : high voltage and horizontal drive, vertical drive, and amplifier.

##### High Voltage And Horizontal Drive

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The horizontal drive circuit generates a horizontal scan which sweeps the electron beam from left to right on the CRT screen. The horizontal sync signal is delayed in a shift register controlled by a rotary switch. This is used to center the raster by delaying horizontal reset with respect to video blanking. This delayed signal then feeds a high voltage transformer which supplies the 12kV voltage required by the CRT. At the same time, a signal is generated to drive the horizontal yoke. The high voltage transformer also helps generating bias voltages which control the brightness and focus.

##### Video Amplifier

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The function of the video amplifier is to interface the low logic input signals to the higher levels required to drive the CRT. The video circuitry is very fast and it typically features rise and fall times of 15 ns or less. Half bright (+5 volts on CRT cathode) is used for inverse video display, while full bright (0 volt on CRT cathode) is used for normal video.

##### Vertical Drive

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The Vertical Drive circuit generates a vertical scanning waveform which causes the electron beam in the CRT to be moved from the top to the bottom of the screen.

A positive vertical ramp is generated and it is sampled by an integrator. The ramp is integrated into a parabola which is used to slow the deflection down at the extremes of the ramp to correct for non-linearity due to the flatness of the CRT screen.

An output amplifier converts the ramp from the integrator to a current which is applied to the deflection yoke. This current is compared to

the ramp voltage by a comparator. The DC operating point of the output amplifier is stabilized.

### 2621B POWER SUPPLY (TERMINAL WITHOUT PRINTER)

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#### INTRODUCTION

The 2621B Power Supply generates the following voltages: +12V at 1.8A, +5V at 2.5A, and -12V at 0.75A. It also generates a Power On and Power Fail warning signal.

The Power Supply consists of five sections: the +12 Volt Regulator, +5 Volt Regulator, -12 Volt Regulator, Power On/Power Fail Circuit, and the SYNC Circuit. These five sections plus a power bracket (consisting of a transformer, rectifier, and a filter) generate the necessary power and logic signals for the Processor and Keyboard PCA's. Figure 8-4 shows a simplified block diagram of the Power Supply.

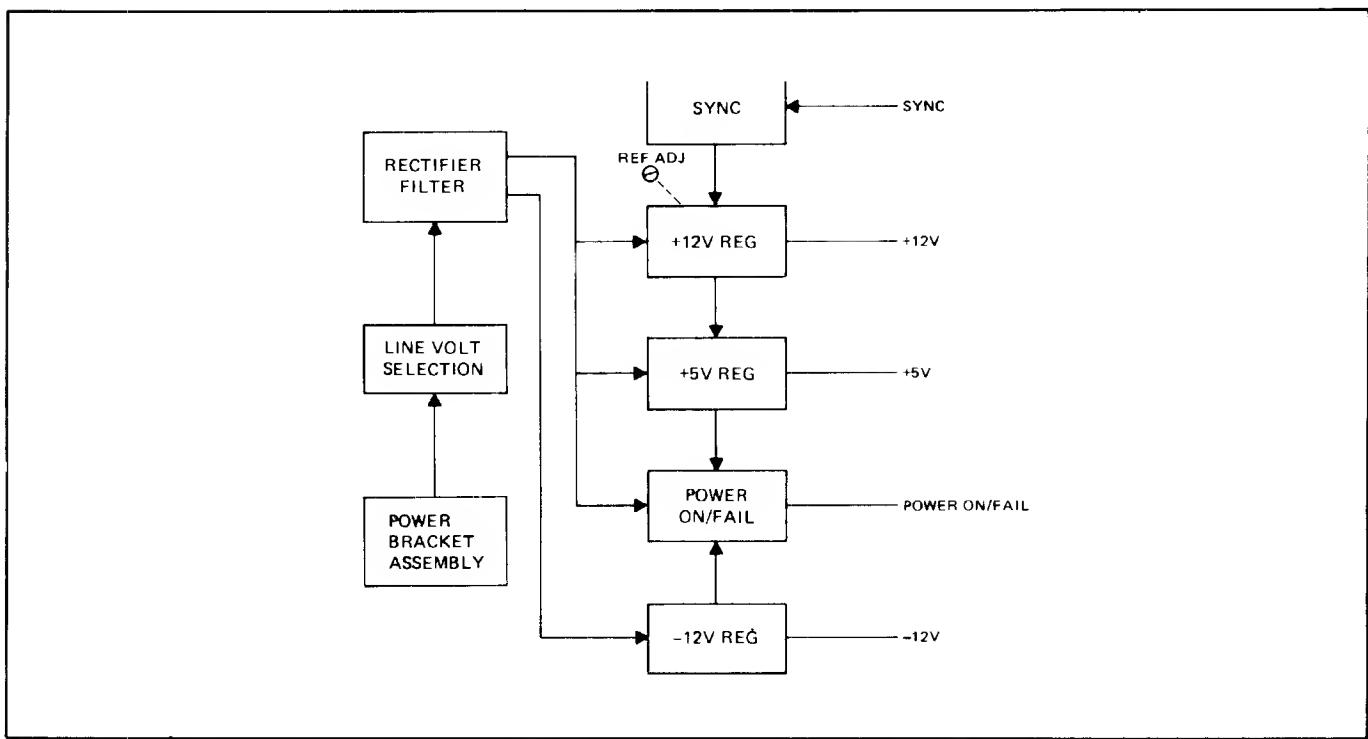


Figure 8-4 2621B Power Supply Simplified Block Diagram

#### + 12 VOLT REGULATOR

The +12 Volt Regulator is a switching regulator which steps down and regulates the main unregulated supply voltage (25V typically at 115V line input). It also generates a ramp, +2.5V reference, and a clock pulse which are used by the +5 Volt Regulator.

The switching regulator is an integrated circuit which generates a +5V reference, 25 KHz RAMP, 25 KHz clock pulse, an output pulse which changes in width to regulate the supply, and the necessary circuitry to sense the +12V supply. The output voltage of the switching regulator is regulated by controlling the on and off time of the switching elements.

The output current is sensed by a comparator and it is protected with a current limit circuit set at 2.5A. A foldback characteristic is obtained because the +12V output forms part of the current reference, and as it decreases (due to current limit) the current limit reference decreases.

The output voltage is filtered by a smoothing filter and it is prevented from overvoltage by a 15V zener diode. The output voltage is adjusted by adjusting the V ADJ potentiometer (located on the Power Supply PCA). Since the +5V supply tracks the +12V supply, adjusting the +12V supply will adjust the +5V supply.

#### +5 VOLT REGULATOR

The action of the +5 Volt Regulator is identical to the +12 Volt Regulator except that it receives all of its timing signals and its reference voltages from the +12 Volt Regulator section. These signals synchronize the two regulators thus reducing their RFI output, and the shared reference allows them to track.

Circuit operation is identical to the +12 Volt Regulator except that it requires an error amplifier and comparator to generate the drive pulse for the power switching device. An error amplifier compares the +5V output which is divided to the +2.5V reference. The output of the error amplifier is applied to one input of the comparator which compares it to the voltage ramp received from the +12 Volt regulator. The comparator turns on a current source until the ramp voltage exceeds the error voltage. The output voltage is prevented from overvoltage by a zener diode (6.19V).

#### -12 VOLT REGULATOR

The -12 Volt Regulator supplies the minimal 75mA requirements of the processor PCA for negative voltage.

The -12 Volt regulator receives its voltage from a voltage doubler which operates from a voltage obtained across the full bridge rectifier. The doubler outputs a voltage equal to the voltage used by the positive regulators. The -12 Volt Regulator is a linear regulator which down regulates the -25V output of the doubler to -12V.

#### POWER ON/FAIL CIRCUIT

The Power ON/Fail Circuit serves two functions. It senses all output voltages and indicates to the Processor PCA when the +5V supply is in

regulation. It also senses the line input voltage and it indicates a power fail condition shortly before the switching regulators go out of regulation.

An amplifier is used as a comparator to sense line input voltage. When the voltage drops to about +15V the comparator outputs a power fail signal. Another comparator senses the +5V line and outputs a signal to indicate that the +5V supply is in regulation.

#### SYNC CIRCUIT

The Sync Circuit receives a horizontal drive pulse from the Sweep PCA, and uses it to synchronize switching regulation to that of the sweep rate. This is necessary to prevent the switching rate of the Power Supply from interfering with the CRT display. CRT displays are very sensitive to noise on the power supply lines.

#### POWER BRACKET ASSEMBLY

The Power Bracket Assembly consists of a line filter, power switch, and a power transformer. The power transformer is shielded to prevent it from interfering with the CRT display. The line input voltage is selected by a combination input cable into the appropriate power source receptacle on the Power Supply PCA.

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#### 2621B POWER SUPPLY (Option 050 - TERMINAL WITH PRINTER)

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#### INTRODUCTION

The Power Supply used is a switching supply that provides regulated voltage supplies of +16VDC, +-12VDC, and +5VDC. It also generates a Power On and Power Fail Warning signal.

It consists of five basic sections: the Primary Switcher, Secondary Regulation, Protection Circuitry, Logic Signal interface and the Bootstrap Supply. Figure 8-5 shows a simplified block diagram of the Power Supply.

#### PRIMARY SWITCHER

The Primary (off-line) Switcher consists of a Line Rectifier, Primary Switcher, Secondary rectifier, and Primary Switching Regulator. These subsections transform power from the AC line to isolated +-16VDC sources.

LINE RECTIFIER. The line Rectifier rectifies and filters the incoming AC power to an output voltage of +-150VDC at nominal line. Line voltage

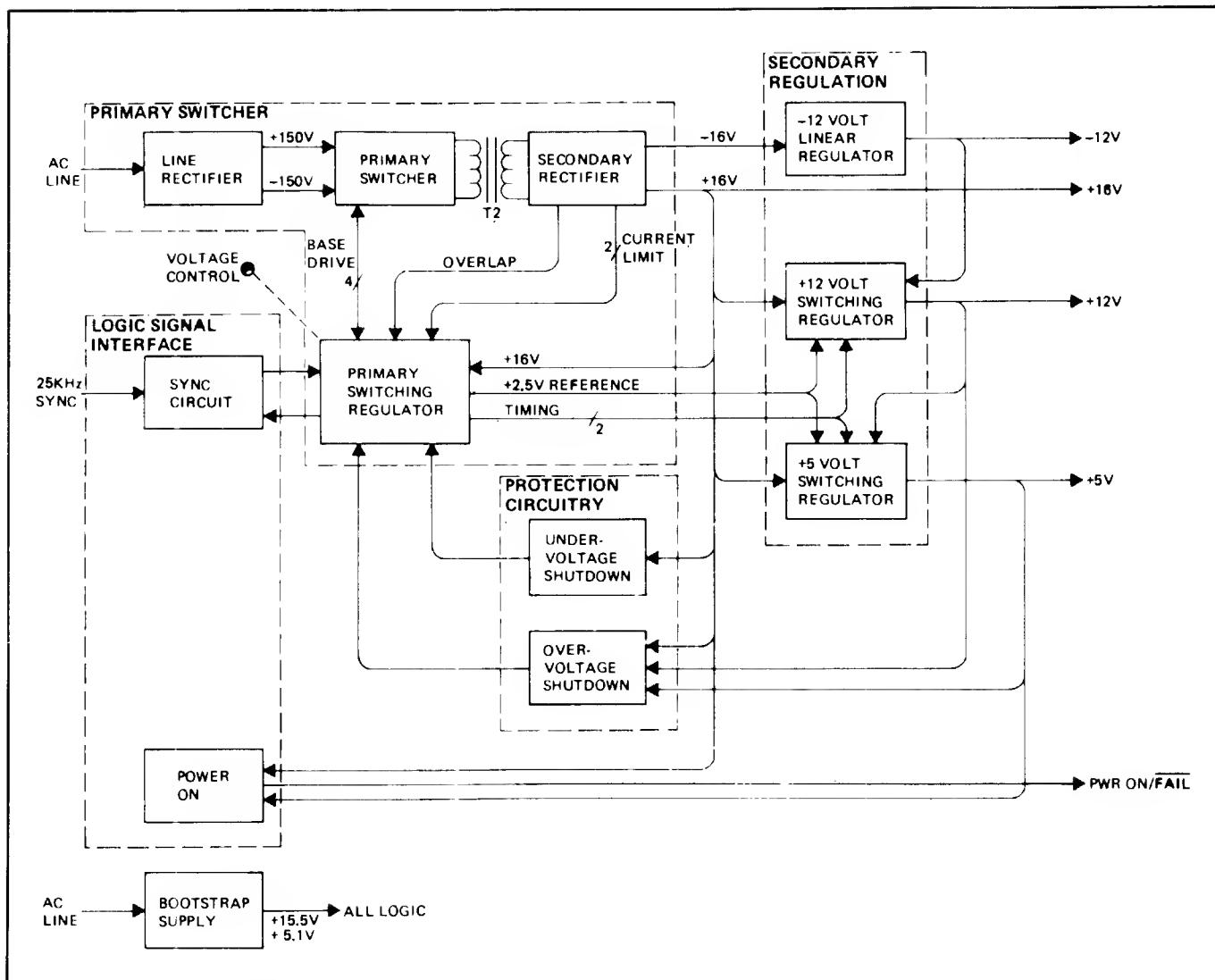


Figure 8-5 2621B Option 050 Power Supply Simplified Block Diagram

selection is determined by fuse location which configures the Line Rectifier as either a voltage doubler (115VAC operation) or as a full wave bridge (230VAC operation).

**PRIMARY SWITCHER.** The Primary Switcher uses the Primary Switching Regulator to alternately switch the primary of power switching transformer T2 between +150VDC (outputs of the Line Rectifier). The Primary Switcher employs pulse-width modulation to ensure voltage regulation, and voltage clamping to prevent the transformer primary from overvoltage.

**SECONDARY RECTIFIER.** The output voltage of power transformer T2 is rectified and filtered by the Secondary Rectifier. This section also provides +16V outputs, current limit sensing, and overlap voltage to the Primary Switching Regulator.

**PRIMARY SWITCHING REGULATOR.** The Primary Switching Regulator provides the controls necessary for the Primary Switcher section to operate. The main part of the Switching Regulator is a regulator IC (SG3524), which provides fixed frequency pulse-width modulated voltage regulation to the Primary Switcher.

A 2.5V reference from the internal 5V linear regulator powers the external CMOS IC and provides voltage referencing for the +12V and +5V Switching Regulators. Adjustment of a potentiometer labeled "Voltage Control" proportionally adjusts the +5V, +12V, and +16V supplies.

Switching operation is inhibited by current limiting the secondary of power switching transformer T2.

To prevent destructive conduction overlap in the Primary Switching Regulator during low line conditions, the overlap voltage output from the Secondary Rectifier inhibits the switching operation of the regulator IC (SG3524).

#### SECONDARY REGULATION

The Secondary Regulation section of the Power Supply consists of three subsections: The -12 Volt Linear Regulator, the +12 Volt Switching Regulator, and the +5 Volt Switching Regulator.

**-12 VOLT LINEAR REGULATOR.** The -12 Volt Linear Regulator consists of a -12V regulator IC and an output bypass capacitor. This regulator provides a fixed output voltage (-12V), and both thermal and current limit protection.

**+12 VOLT SWITCHING REGULATOR.** The +12 Volt Switching Regulator receives +16V from the Secondary Rectifier, and both +2.5V reference and switch timing from the Primary Switching Regulator, together they generate a +12V regulated supply.

The main component in the +12V Switching Regulator is a switching IC (Darlington transistor) that provides a switching regulated output supply of +12V.

Switching noise and power dissipation is reduced. The switching IC is protected from reverse bias breakdown by a zener diode should a short to ground occur on the +16V output from the Secondary Rectifier.

Voltage Regulation is provided by comparing the switching reference voltage to the feedback voltage. The difference is compared to a linear ramp voltage and when the ramp voltage exceeds the reference voltage, the switching action stops until regulation returns. The switching reference voltage is clamped at 4.3V to prevent overvoltage at turn-on.

**+5 VOLT SWITCHING REGULATOR.** The operation of the +5 Volt Switching Regulator is identical to the +12 Volt Switching Regulator except that it is prevented from overvoltage by a 6.19V zener diode. A comparator prevents the +5 Volt Switching Regulator from operating if the +12V output from the +12V Switching Regulator drops below 10V.

## PROTECTION CIRCUITRY

The Power Supply provides protection for both overvoltage and undervoltage conditions on the +16V, +12V, and +5V output supplies.

**OVERVOLTAGE SHUTDOWN.** The overvoltage thresholds of the +16V, +12V, and +5V supplies are set at +17.2V, +13.4V and +5.6V respectively. The Overvoltage Shutdown subsection monitors these supplies for abnormally high voltages.

Each output supply is compared to a reference voltage (5.1V from the Bootstrap Supply) and if any of these supplies rises above its threshold level, the switching regulator IC (SG3524) is suspended and the Primary Switcher section is disabled. Thus the Power Supply is shutdown if overvoltaging should occur.

**UNDERVOLTAGE SHUTDOWN.** The Undervoltage Shutdown subsection monitors the +16V output supply for undervoltage conditions. If the +16V supply drops below +13V for approximately two seconds or more, a comparator compares this voltage with a reference voltage from the Bootstrap Supply section and activates a shutdown sequence. The Primary Switching Regulator section is disabled which effectively shuts down the Power Supply.

## LOGIC SIGNAL INTERFACE

The Logic Signal interface section consists of two subsections: the Sync Circuit which synchronizes the Power Supply's switching rate to the video sweep rate, and a Power On circuit which provides indications for both Power On and Power Fail conditions.

**SYNC. CIRCUIT.** The Sync Circuit synchronizes the Power Supply's switching rate to twice the video sweep rate. Synchronizing prevents switching noise from appearing on the CRT display. The Sync Circuit is a digital phase-lock-loop synchronizer limited to input sync signals ranging from 20 to 30 KHz, which corresponds to Power Supply switching rates ranging from 40 to 60 KHz.

**POWER ON.** The Power On circuit serves two functions. One, it senses the output of the +5 Volt Switching Regulator and it indicates when the +5V output is in regulation. Two, it monitors +16V output and generates a power fail indication when the +16V output drops below +13V.

## BOOTSRAP SUPPLY

The Bootstrap Supply provides the start up power for the Primary Switcher. Once the Primary Switcher is operating satisfactorily, the Bootstrap Supply receives its operating power from the +16V output.

**KEYBOARD MODULE**

**INTRODUCTION.** The keyboard module scans the keys and returns their status to the processor PCA. It consists of a counter and decoder. These two subsections make up the scanning circuit of the keyboard.

**KEYBOARD SCANNING.** The processor uses one line to increment the counter in the keyboard PCA; decoding the content of this counter enables to read the state of each of the 68 keys. This state appears on a second line directed to the processor PCA. A third signal from the processor is used to reset the counter, to ensure that the firmware is synchronized with the key being read.